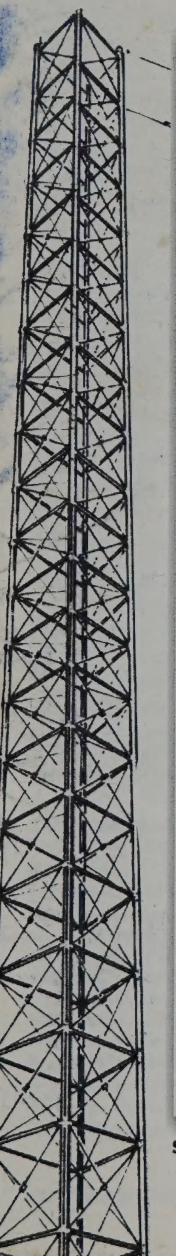
The OTB

THE OLD TIMER'S BULLETIN AUGUST 2002 VOL. 43 / #3

OFFICIAL JOURNAL OF THE ANTIQUE WIRELESS ASSOCIATION, INC.

Published for the collector, historian and old-time radio operator



THE OLD TIMER'S BULLETIN

OFFICIAL JOURNAL, ANTIQUE WIRELESS ASSOCIATION
Published for the Old Time Wireless Operator, Historian and Collector

Vol. 4 AUTUMN 1963 No. 3

First National Get-Together

Amateur historians and collectors with their wives assembled from 15 different states at Holcomb for the first meet on Aug. 16 and 17. Those attending the greatest distance flew in by plane; however, W4AA (North Carolina) and W9CF (Illinois) came by car.

The early 'birds' were entertained Friday night by a 16 mm. movie taken many years ago of the old German installations at Tuckerton and Sayville and the Marconi stations at New Brunswick and Marion as they were under the RCA administration.

Saturday started at the nearby New York Annual Steam Pageant. Having the 'gang' attend this affair was a suggestion with mix feeling since there was no tie-in with radio. Much to our surprise, everyone appeared to enjoy themselves in spite of the noise and smoke !

Under a threatening sky, the 'meet' got underway at 3 P.M. when President Batterson welcomed the group and turned it over to W2ICE who acted as M.C.

'Link' Cundall, [illegible] early equipment at [illegible]

W2QY briefly demons[illegible] of early equipment [illegible] transmitter using an [illegible] interrupted. A 1908 M[illegible] detector was connected [illegible] and ground (no tuning ind[illegible] capacitors) and fed into an audio amplifier. One could hear faintly a Rochester broadcast station on a 260 meter wave 25 miles away and heavy static from a nearby electrical storm. This same hookup received LW NSS 450 miles away away the night before.

Report by Historians and Collectors

The 'keynote' of the afternoon was given by Ralph Batcher, Pres. of the Radio club of America. He stressed the need to authenticate and catalog historical equipment. Ralph was followed by Jimmy Burns (Chairman, Veteran Wireless Operator's Assn., Washi[illegible] Roland Bourne, W1ANA (Cur[illegible]

SEE "FROM THE EDITOR," PAGE 5

THE OLD TIMER'S BULLETIN

OFFICIAL JOURNAL, ANTIQUE WIRELESS ASSOCIATION, INC.
BRUCE L. KELLEY 1914-1997, FOUNDING EDITOR

WEB SITE: http://www.antiquewireless.org
Antique Wireless Association, Inc. is an IRS 501(c)3 charitable organization.

AWARDS ADMINISTRATORS

AWA Houck Awards.....Barney Wooters
Bruce Kelley-OTB *Award*.....Bob Thomas, W3NE
Equipment Awards.....Geoffrey Bourne
J. Albert Moore Award.....Thomas Peterson, Jr.
Taylor Award.....Pete Yanczer
Tyne Award.....Lauren Peckham

WHOM TO CONTACT

Please write legibly. Enclosing an SASE speeds replies.

DUES AND ADDRESS CHANGES: Joyce Peckham (Secretary), Box E, Breesport, NY 14816, (607) 739-5443; FAX: (607) 796-6230, e-mail: awapeckham@aol.com. Dues: $20 per year in U.S.; $25 elsewhere. Life membership: $400 in U.S.; $500 elsewhere. Make checks payable to "AWA."

AWA OFFICIAL BUSINESS: William B. Fizette, (President), RR 1, Box 55, Henryville, PA 18332, (570) 629-0637.

BUSINESS CARD ADS: Robert W. Perry, W2TIX, "Smoke Signals," 131 E. High St., Painted Post, NY 14870.

OTB SUBMISSIONS: Marc Ellis, Editor, *OTB*, P.O. Box 1306, Evanston, IL 60204-1306, (847) 869-5016, e-mail: mfellis@enteract.com.

AWA REVIEW SUBMISSIONS: Tom Perera, W1TP, Editor, AWA Review, 11 Square Hill Road, North Caldwell, NJ 07006, e-mail: tom@wltp.com.

ORDERS FOR THE *AWA REVIEW* OR BACK ISSUES OF *OTB*: Edward M. Gable, 187 Lighthouse Rd., Hilton, NY 14468, (716) 392-3088.

WANT ADS AND COORDINATION OF SLIDE/VIDEO SHOWS: Richard Ransley, P.O. Box 41, Sodus, NY 14551, (315) 483-9307.

ANNUAL CONFERENCE BUSINESS: Hugh J. Davey, 32 Paula Dr., Long Valley, NJ 07853; (908) 850-9086; beagle2@sprynet.com.

FINANCIAL REPORTS: Randolph W. Haus, KB2PLW, P.O. Box 665, 6935 Rte. 227, Trumansburg, NY 14886; (607) 387-5293.

AWA ELECTRONIC COMMUNICATION MUSEUM: Please see "Museum News" column for contact and administration information.

ANTIQUE WIRELESS ASSOCIATION, INC.
BOX E, BREESPORT, NEW YORK 14816

The Old Timer's Bulletin is published approximately four times a year by and for members of the Antique Wireless Association, Inc. AWA is a nonprofit historical society founded in 1952 and chartered by the State of New York. *The Old Timer's Bulletin* is available through AWA membership. Its issuance is subject to change from time to time as to frequency, content, and size. It is not liable in any way for any buying-and-selling transaction entered into as a result of its content.

CONTENTS

COMPLETE CONFERENCE AGENDA

FEATURE ARTICLES

COLUMNS

DEPARTMENTS

THE PRESIDENT'S MESSAGE

Periodically we find it necessary to explain, and hopefully clarify, the management structure of the AWA for our newer members. The members, some 3800 strong at present, are the reason for the organization. They are represented by the board of directors which, in turn elects the officers. Not generally understood is that the Museum and AWA Inc. (the "club") are now two distinct organizations, with separate management, separate officers and governing boards (directors for the AWA Inc. and trustees for the Museum), and separate finances. There is some overlap, allowable under the New York state guidelines, between the AWA and the Museum directors/trustees, because of the nature of the organization and historical interrelationship between the two groups.

Within the AWA Inc. the Members elect the directors following procedures outlined by the by-laws. The Board of Directors in turn elect the officers, who are responsible to the directors and serve at their pleasure. The board actually runs the organization by establishing policy. The officers in turn do the managing. The president, for example, is nominated and elected by the board, and serves at the pleasure of the directors for a specified term.

The AWA Board of Directors has the responsibility of overseeing the management and activities of the organization. The primary duty of the directors is to the organization, and they function following basic and well-established management rules to perform this duty. In our case, we take it a step further, and we have as a goal that every board member will have at least one ancillary job that helps promote and maintain the organization. For example, board members are involved in the conference, *The OTB*, advertising, regional meets, financial management, legal affairs, and outreach programs, among others.

The AWA is essentially a volunteer organization. However, as time goes on we do find that we have to contract for some services, as it is getting difficult to find people with the necessary skills who can afford or are willing to donate large blocks of time to the AWA on a continuous basis. So far we have been lucky, but expenses will inevitably climb.

Complete information on the annual conference is in this issue of *The OTB*. We hope that most of the conference "regulars" will return and that many of the new members will come for their first visit. For several reasons we are opening the conference at an earlier date (near the end of August) this year, and hope it will be convenient.

Last year the Marriott Thruway, where we have been holding the conference for many years, suddenly changed hands just before our opening and became a dormitory and conference center for the Rochester Institute of Technology. This caused some inconvenience for our members, but the problems have been worked out and that facility will welcome us back this year. Despite a thorough search by the Conference Committee for alternate locations within easy travel distance of our museum, where many members enjoy spending time during the conference, we have yet to find a venue better suited to our needs.

Finally we have to close, on a sad note, by reporting the recent passing of our beloved Ralph Williams, who has done so much over the years to promote and contribute to the activities of the AWA. Among other noteworthy contributions, he and his wife Elinor for years ran the Old Equipment Contest at the AWA Conference, and it will not be the same without him. Ralph, it has been a pleasure and an honor to have known you.

LETTERS TO THE EDITOR

All letters to the Editor are read with interest and attention, though not all can be published in this column. Letters may be paraphrased, shortened or otherwise edited to fit the available space. The statements made by our correspondents are their own opinions and do not necessarily reflect the views of either the OTB *staff or the Antique Wireless Association.*

OLDEST TRANSISTOR RADIO?

I read with interest about the prototype transistorized broadcast receiver developed by Bell engineer F.E. Radcliff in 1951 and just presented to the AWA Museum by Jim Troe (May, 2002 "Museum News"). However, it may not have been the *first* transistor radio.

FROM THE EDITOR

A Glimpse of the First National Conference

Featured on our cover this time is the front page of the Autumn, 1963 *The Old Timer's Bulletin*. Since that particular issue was a retrospective of the very first AWA National Conference, I thought it would be appropriate for our current conference theme: "Fifty Years of AWA."

That long-ago conference began Friday evening, August 16th, 1963. We're not told how many attended, but we know they arrived from fifteen different states. Early arrivals enjoyed a film on old commercial spark stations, including the German installations at Tuckerton and Sayville.

The next morning, the group adjourned to visit the New York Annual Steam Pageant and apparently spent most of the day there! The AWA proceedings seem not to have started until 3 pm when, under threatening skies, the members were seated outside the Barn Museum in Holcomb. President Batterson opened the meeting, then turned it over to MC Bruce Kelley. Linc Cundall demonstrated several pieces of early equipment, including a 1908 Marconi magnetic detector which, when hooked up to antenna, ground (minus any tuning circuits), and an audio amplifier brought in a Rochester radio station and some static from an electrical storm.

Then the group was addressed by prominent historians and collectors, including (to name just a few) the President of the Radio Club of America, Chairman of the Veteran Wireless Association, and the Curators of the ARRL and Ford museums. If there was a flea market, or even a little tailgating, going on, it wasn't mentioned.

The finale banquet was held that night at the Holloway House restaurant. Seems the group was too big for any of the dining rooms, so it was split up along gender lines with husbands and wives dining separately! I guess they figured that the wives wouldn't be interested in guy stuff like hearing about Ed Raser's key collection or Lloyd Espenschied's presentation to AWA of John Hogan's W2XR experimental transmitter.

Such a sexist approach would hardly be tolerated today, but after the noise and smoke at the steam pageant and the curatorial talks that followed, the women may well have been glad to be among themselves for awhile. History does not record what was discussed at their tables.

It was reported that a great time was had by all and the participants were hopeful that the conference might become an annual affair. The facilities of the New England Wireless Museum and the Ford museum were offered as venues for future gatherings.

The conference has indeed been held annually since then, becoming bigger and better as the years passed.

During the early years the meeting convened at different locations, including twice each at the New England Wireless and Ford museums. Other locales of note were the Franklin Institute, the Smithsonian, and the Gray History of Wireless Museum. As attendance increased, the gatherings became less mobile, settling down to a permanent locale, first at the Sheraton Inn in Canandaigua, New York, then at the Thruway Marriott (now the Rochester Institute of Technology Conference Center) near Rochester.

That first meeting was rather different than the four activity-filled days outlined in the special conference section included with this issue. But even though we've come a long way since those days, the spirit of excitement and camaraderie was clearly exactly the same then as it is now.

Before closing I want to thank Chuck Schwark, our web page coordinator, who designed the 50th anniversary logo seen on our cover.

When Bell Labs held its press conference on May 30, 1948 to announce discovery of the transistor, it demonstrated a transistor oscillator, amplifier—and at least one radio. This was reliably reported at the time (in *Press Release from Bell Telephone Laboratories—A. M. Papers of Thursday, July 1, 1948*; *Bell Laboratories Record*, Aug.1948, p. 322; and the excellent 1997 book *Crystal Fire—The Birth of the Information Age,"* p. 164.)

It was a serious radio, too. *Electronics* (Sept. 1948, p.69) described it as "a broad-band r-f amplifier, a tuned r-f stage, local oscillator, mixer, three stages of i-f, second detector, and four stages of a-f amplification, the last being push-pull. A total of 11 Transistors were used in the amplifier stages with 2 germanium diodes for the mixer and detector stages, and 2 selenium rectifiers for the power supply. The receiver brought in local stations, delivering 25 mW of audio power to its loudspeaker." The schematic diagram of a very similar Bell Labs set from 1949

has lately been added to the AWA Museum files.

But even this wasn't the *first* transistor radio. *Crystal Fire* reports, "By late May [1948]…Bell engineers…built a telephone repeater…based on this new amplifier. They also had a working radio receiver"(p. 158).

This would be natural: once a working telephone repeater (audio amp) was on hand, any lab tech could attach a crystal detector to the front end and tune in WNBC. The Bell Labs location at Murray Hill is almost within sight of the New York 50-kW AM stations, so even a primitive radio would give gratifying results.

LUDWELL SIBLEY
via e-mail

WHY THE NEGATRON?

It was with great interest that I read Ludwell A. Sibley's "25 years: Saga of the Saga" in the AUGUST 2002 issue of *The OTB*. What a remarkable book the *Saga* has turned out to be.

May I add some comments of my own which you may wish to publish in *The OTB*. First I would like to correct Ludwell on one small point; he said Bruce Kelley was the book's only champion among antique-radio editors. At the time, 1977, the British Vintage Wireless Society (BVWS) was a fledgling organisation less than two years old and I was editor of the *BVWS Bulletin*. I had long awaited the publication of the *Saga* and, when I received one of the early copies from Dave Brodie, I promptly arranged for a batch to be ordered for our members. So it looks as if there were *two* editors who knew a good thing when they saw it.

When my copy of the *Saga* arrived through the post I was overwhelmed with the its scope and eagerly set about reading it. In the December 1977 issue of the *BVWS Bulletin* I apologized to readers, saying that, if the *Bulletin* arrives late, "…blame Gerald Tyne—I simply can't put his book down!"

I exchanged several letters with Gerald until the time of his death in 1981. Bruce Kelley and Gerald Tyne were two larger-than-life characters and I have fond memories of the words of encouragement I received from both of them when setting up BVWS. Although I met Bruce several times I never had the pleasure of meeting Gerald. However, when staying briefly in New York in 1978, I had a good long telephone conversation with him with the help of his wife.

One of the many questions I asked him concerned the choice of the Negatron for the front cover illustration of the *Saga*. Why the Negatron? He said he had not been involved in that decision and had no idea why it had been chosen. He fully agreed that a more recognizable illustration might have been better. I wonder if any member of AWA knows the story behind the choice of that cover illustration?

The Negatron played almost no part in the history of the valve (vacuum tube). It was devised in 1916 by John Scott-Taggart (joint inventor of the Neutrodyne receiver) and was described in some detail by him in his *Thermionic Tubes in Radio Telegraphy and Telephony* in 1921. Despite its useful negative resistance characteristic, it never became a serious commercial device. Perhaps that alone could justify its use as the *Saga* cover, for the path of a true Saga is littered with unfulfilled promises.

DR. ANTHONY CONSTABLE
BVWS AND HON. MEMBER AWA
via e-mail

Jerry Vanicek, whose article "John Scott-Taggart, Father of the Negatron" appeared in the Nov. 1994 *OTB* and included a photo of the tube, spoke about this issue with Tyne's wife Gertrude. She told him that the cover picture had been chosen without input from Tyne. However, the selection did draw compliments from several British tube collectors who were pleased to see recognition given to Scott-Taggart. Mrs. Tyne went on to describe the latter as the British equivalent of Hugo Gernsback in terms of promoting radio to the general public.—*Ludwell Sibley*

ASBESTOS THREAT VERY REAL

My article "Asbestos Exposure and Radio Collecting" in the May issue of *The OTB* was intended as a brief synopsis of the topic and a warning to readers, not a exhaustive review. Asbestosis, a fibrotic scarring of the lungs, is the most common lung condition caused by exposure to asbestos and results in symptoms similar to emphysema. Cancer risk is increased, but is not the main sequlae to exposure. One reader sent me an excerpt from a book titled *Official Lies*, an apparent expose' of government hoaxes and scares, which raises doubts about the danger of asbestos. Rather than the two types of asbestos referenced in that diatribe, there are *three* types: amosite, crocidolite and chrysolite.

The first two have needle-like fibers that can be deeply inhaled and appear to be the most hazardous. Chrysolite, a serpentine fiber, is not as deeply inhaled and does not seem to be as virulent but still poses a risk. Before the 1970s, nearly all asbestos was a mixture of the different fiber types, and this would apply to the radios

dealt with in my article. Today, 99% of the world's current production is the apparently-safer chrysolite.

After reviewing hundreds of cases of asbestosis (fibrotic lung disease) and with personal knowledge of a former asbestos-exposed employee dying of mesothelioma, I have no doubts about the severity of the dangers of asbestos exposure. But, then again,I am aware there are some who still doubt we landed on the moon and others who think Elvis is still alive. I am sure the vast majority of *OTB* readers will respond wisely to the information provided in my article.

JOSEPH G. JACKSON, M.D.
via e-mail

CONFERENCE VISIT PLANNED FOR MOBILE HAM MUSEUM

I am planning to bring my Mobile Ham Radio Museum to this year's AWA meet in Rochester, August 28-31. Those who attended the meet in 1998 or 1999 may remember that the museum is housed in an early 1974 art deco RV-type vehicle.

The museum will feature some new exhibits for its 4th anniversary. One will be a Scanning Disk Television Receiver from about 1932 (display only, not working). Another will be a Hallicrafters "S-1" receiver, the first model produced by that company. I'm also planning to bring the 1927 TGTP homebrew transmitter that was featured on the cover, and written-up in the "Old Radio" column, of the January 2002 issue of *QST*.

Because of a change of career and a new employer, there is a remote possibility that my trip could be canceled. If anyone needs current information about this, please check my the museum web site at: www.eht.com/oldradio/museum/ for the latest schedule.

JOHN DILKS
via e-mail

POSSIBLE SUPER-REGEN PROBLEMS

There's missing dot in the schematic for my super-regenerative detector circuit ("Breadboarding" for May, 2002). The wiper of the regeneration control should connect *both* to the cold side of the 10-mH coil and the top of the .022-uF bypass cap. Without that, the screen grids at pin 5 won't get the positive voltage they want.

If the circuit won't oscillate even when the wiring is corrected, try reversing one of the coils in the quench circuit—say the 10 mH coil at the grid, pin 3. When an oscillator of mine won't take off, that's usually what's wrong with it. Or maybe you've got two of the grids reversed; pins 3 and 5 have to be correct or the tube won't be happy.

DICK PARKS
via e-mail

NEW LF AND HF BANDS PROPOSED BY FCC

In a "Notice of Proposed Rule Making" dated May 15, 2002, the FCC is supporting some of the new ham allocations petitioned for by the ARRL. These include a band for LF experimental work at 135.7-135.8 kHz, a new HF band at 5250-5400 kHz, and expanded privileges in the 2400MHz band. You can read the "Notice" on the ARRL web site at http://www.arrl.org/announce/regulatory/et02-98/. Also check the Long Wave Club of America site at http://www.lwca.org/ for updates on what the LF experimental community has to say.

FRANK LOTITO
via e-mail

MEISSNER MEMORIES

Bill Fizette's article on restoring a Meissner radio ("A Structured Approach to Fixing up Those Nice Old Radios," May 2002 issue) brought back some memories. In 1936-37, while I was a kid in high school, I worked after school for a radio engineer. My job was to assemble Meissner radio kits and build audio amplifiers for sale to restaurants and bars. This was my first exposure to superheterodyne receivers and high-power audio amplifiers, and I found it quite a learning experience. But one day, when I went to work, he told me I was laid off. The next day, he was gone as was common in those days.

ALTON A. DUBOIS, JR.
Queensbury, NY

BABCOCK GARAGE SALE A GREAT SUCCESS

That free *OTB* classified ad for our antique radio garage sale near Roanoke, VA (held on March 16 and 17) really drew the buyers! I highly recommend it to others needing to sell off a large collection. If all the AWA members within in a radius of 200 miles from Roanoke, VA, showed up, I figured we'd see a dozen people. But over 30 people visited from as far away as New Jersey, New York and Missouri. And they all found lots of things they liked. Of course the ad stated that this was an entire collection (the estate of my twin brother Ted Babcock) with more important items than at many antique radio meets.

(continued on page 18)

AWA NEWS

***OTB* POLICY ON PROMOTING EVENTS:** The *OTB* is pleased to list the meets and meetings of any established antique radio organization, whether or not it is associated with the AWA. Do not send your information directly to the *OTB* Editor. Please send it to Joyce Peckham, Box E, Breesport, NY 14816. Closing date is six weeks prior to first day of month of issue.

Calendar of AWA Activities

August 3
AWA Florida Meet

August 10
NFWA/AWA Meet

August 28-31
AWA Annual Conference

October 26
CCAWA Fall Swap Meet

November 8-10
VRPS/AWA Convention

November 10
AWA, Inc. Membership and Board Meeting

November 10
AWA Museum Membership and Board Meeting

Calendar of Meets

(AWA logo identifies AWA-sponsored events)

AWA FLORIDA MEET

August 3

Sarasota Lions Club, 120 S. Tuttle Ave., 7 a.m. to 11 a.m. Info: Jack Warren (941) 349-4875; Chip Taylor chip100@gte.net.

ARCI RADIOFEST XXI

August 9-11

Presented by the Antique Radio Club of Illinois at the Ramada Hotel, 345 River Rd., Elgin, IL 60123. We have moved the show back to the more popular Friday through Sunday time slot. Large radio swap meet, contest, presentations, donation auction, and much, much more. All sellers must be members of ARCI; no admission charge for non sellers. ARCI Membership: $15.00; Selling Spaces: $40.00 for the first; $50.00 per additional; limit 3. Special one-day single-space selling rates: Friday only, $30.00; Saturday only, $20.00; Sunday only, free. For more info: contact ARCI at P.O. Box 1139, La Grange Park, IL 60526, e-mail ARCI at arci31280@aol.com, or visit http://members.aol.com/arci31280/arci.htm.

NIAGARA FRONTIER WIRELESS ASSOCIATION

August 10

Joint meet with the AWA and our largest of the year. At the Amherst Museum, Amherst, NY. From the NY State Thruway, take Exit 49 (Transit Rd., Rt. 78) north nine miles. Left on Tonawonda Creek Rd. just before entering Niagara County (there is also a Tonawonda Creek Rd, in Niagara County on the north side of the Creek). Proceed two miles west to the Museum. The meet is outside just west of the buildings. There are lots of motels and restaurants at Thruway Exit 49. Flea Market 8 a.m. to noon. Museum exhibits open at 11:30 (there's a full room of early radios and TVs). Bring items for the auction beginning at about 11 a.m. There will also be a donation auction. Contest categories: 1. Any battery-powered 1920s radio; 2. Any AC-powered radio; 3. Any transistor radio; 4. Any novelty radio; 5. Open category—any radio or radio-related item 6. Any radio speaker. Entry fee for non-museum members is $6.00. Spouses $2.00. Includes annual NFWA membership and museum admission. No additional fees to sell or for any other activity. Lunch available. For info, call Larry Babcock at (716) 741-33082 or Gary Parzy at (716) 668-2943.

CC-AWA FALL SWAP MEET

October 26

Hosted by Carolinas Chapter of AWA at City Lake Park, High Point Rd., Jamestown NC., 8 a.m. to noon. For more info, visit the CCAWA web site at CC-AWA.org

AWA ANNUAL CONFERENCE

August 28-31

Please see special conference section.

VRPS/AWA CONVENTION 2002

November 8-10

At the Hampton Inn and Suites, Mesquite, Texas, Just east of Dallas on I-635. Old Equipment Contest, Technical Sessions, four auctions, inside Flea Market, Awards Banquet. Theme: 80 Years of Radio Broadcasting and Radio Manufacturing in Texas. For more information and registration packet, contact Ron Daniel, 1416 Lamplighter Lane, Fort Worth, Texas, 76134, Telephone 817-293-6257 or e-mail to vrps @ ctelcon.net.

AWA, INC. MEMBERSHIP AND BOARD MEETING

November 10

At Rochester Institute of Technology Conference Center (formerly Thruway Marriott). I-90 Exit 46 to I-390 North to NY253 West to NY 15 South. Membership meeting at 11 a.m. All members welcome. Semiannual board meeting follows.

AWA MUSEUM MEMBERSHIP AND BOARD MEETING

November 10

Same location as above. Membership meeting at 2:30 p.m. but will be delayed, if necessary, until conclusion of AWA, Inc. Board meeting. Open to any interested member. Followed by Board Meeting.

SUMMARY OF THE AWA INC. BOARD MEETING OF MAY 4, 2002

The semi-annual meeting of the Board of Directors of the AWA Inc., held at the Legion Hall in Bloomfield, NY, beginning at 2:44 p.m., was conducted by V.P.Geoffrey Bourne. The reports of the President, the Secretary, and the Treasurer were presented and accepted. Treasurer Randy Haus submitted a budget proposal for 2002, and the report from the accounting firm, Hevron and Hevron, was read.

The Secretary reported that total AWA membership, domestic and foreign, is 3,606. There are 31 life members from the new offer. Credit cards are now being accepted for new memberships and renewals.

Hugh Davey reported on the 2002 Annual Conference, which will take place August 28-31 with the theme "50 Years of AWA." There will be a book fair, ladies' luncheon, ladies' tea, flea market, auctions, programs, the Friday night banquet, and a Saturday luncheon. The program chairman, Lauren Peckham, reported that the schedule is very full, with programs starting on Tuesday evening. Dates for the 2003 conference were discussed.

The report of regional meets sponsored and co-sponsored by the AWA was presented by Chris Fandt. Ten were listed for 2002. Marc Ellis reported that *The OTB* has been expanded to 76 pages, and that the 50-year special retrospective issue is being prepared. The report of Tom Perera, the editor of the AWA Review, stated that he now has enough material for both the 2002 and 2003 editions. He also expects to be able to complete and deliver the AWA Telegraph Anthology CD in time for the 2002 Conference. A request for funds and approval for production of 500 CDs was approved.

Chuck Schwark reported that the AWA Internet site now averages about 60 hits per day. The newest additions are the Museum Store and order form. The AWA Website has won three awards: The Infography Award of Excellence, the Critical Mass Award, and Safe Haven Award.

Ed Gable reported that the Museum opened on May 5th, and that he has enough staff. Details on ongoing projects and new displays were presented. Tom Peterson, the Museum Director, stated that he is satisfied that the two organizations are working together. The motion was made and passed that the President of the AWA, Inc. and his executive committee define and document the approaches they will use to maintain the relationship between the AWA Inc. and the Museum regarding fiscal and budget, meeting scheduling, and dual Board membership issues.

The problem of dividing the insurance coverage for the two Boards is under review, with a possible need for a new provider. The Investment Committee report was presented by Tom Peterson, and the AWA Treasurer was asked by the Board to look at the monthly income and expenditures and report on cash liquidity needs. Allan Pellnat's report on the AWA trademark application stated that the application is still in process. Bob Schaumleffel reported that advertising for this year came in under the $2500 budget. Ongoing ads have been placed in Monitoring Times, ARC, and QST.

Under New Business, Allan Pellnat's report on an alternative mailing system for *The OTB*, as a possible means of saving funds, was discussed. Other options will be investigated.

The functions shouldered by former Board member Dick Ransley have now been taken over by Bobbi Hagenbach (Conference pre-registration), Bruce Roloson (Conference photography), Chris Fandt (joint-meets coordinator), and the Museum staff (AWA Slide Shows archival and loan).

The Board unanimously approved Honorary Membership for Sherwood Snyder, and reaffirmed its support of the various award committees. The possible need for another summer work session at Ron Frisbie's house was discussed, and the decision left open.

The meeting was adjourned at 5:30 p.m.

AWA LIFE MEMBERSHIPS ARE NOW AVAILABLE

Cost: $400 (U.S.)/$500 (Elsewhere)

Send your check to AWA Secretary Joyce Peckham, Box E, Breesport, NY 14816.
Phone (607) 739-5443.
e-mail: awapeckham@aol.com.

Recurring Meetings & Events

•Antique Radio Collectors of Ohio—meets first Tuesday of each month at 2929 Hazelwood Ave., Dayton, OH (4 blocks east of Shroyer Rd. off Dorothy Lane) at 7 p.m. Also annual swap meet and show. Membership: $10.00 per year. For more info, contact Karl Koogle: mail to above address; phone (937) 294-8960; e-mail KARLKRAD@GEMAIR.COM

•California Historical Radio Society—For info on current meetings, call the CHRS hotline: (415) 821-9800.

•CARS, the Cincinnati Antique Radio Society—Meets on the third Wednesday of each month at ITT Technical Institute, 4750 Wesley Ave., Norwood (Cincinnati) Ohio. For more information contact Greg Tierney, (513) 732-1844, or Bob Sands, (513) 858-1755.

•Carolinas Chapter of the AWA—Hosts four "mini-swap-meets" each year (in January, May, July and October) plus an annual conference, "Spring Meet in the Carolinas," on the 4th weekend in March. Executive committee meets approximately quarterly. For more info, visit the web site at CC-AWA.ORG or contact Ron Lawrence, KC4YOY, Chapter President, P.O. Box 3015, Matthews, NC 28106-3015; phone (704) 289-1166; e-mail kc4yoy@trellis.net

AWA NETS

PHONE:

SUNDAY:

7244 kHz, SSB, noon (NCS:WA4IAM);
3837 kHz, AM 4 p.m. (E.S.T.), 4:30 p.m. (during E.D.S.T.) (NCSs:W2ZM & W2AN)

TUESDAY:

14274 kHz, SSB, 2:30 p.m. (NCSs KC3YE and W0FXY)
3837 kHz SSB, 8 p.m. (NCS WB2SYQ)

MONDAY-WEDNESDAY-FRIDAY:

3867 kHz, SSB, 9:30 a.m. (NCS: W2OBJ)

CW:

DAILY, 4 p.m., 3588 or 7050 kHz. Protocol, informal. Check both frequencies for activity and join in, or call AWA de (your call) and see what you stir up.

First **WEDNESDAY** of each month, 8 p.m., 7050 kHz
2-M REPEATER (Rochester Area)
MONDAY, 7:30 p.m. (NCS: K2GBR)
Receive 145.290 MHz
Transmit 144.690 MHz

•Central Ohio Antique Radio Assn.—Meets at 7:30 p.m., third Wednesday of each month at Devry Institute of Technology, 1350 Alum Creek Rd., Columbus. (1-70 Exit 103B). Contact: Barry Gould (614) 777-8534.

•Cincinnati Antique Radio Society—Meets at 7:30 p.m., third Wednesday of each month, at Great Oaks Institute, Scarlet Oaks Campus,, 3254 E. Kemper Rd., Sharonville, OH 45241. For info and directions, call Tina Hauke at (513) 771-8840.

•Delaware Valley Historic Radio Club—Meeting and auction begins 7:30 p.m. on the second Tuesday of each month. Location: Telford Community Center on Hamlin Ave. in Telford, PA. Annual dues: $15.00, which includes a subscription to the club's monthly newsletter *The Oscillator*. For more info contact Bill Overbeck at (610) 789-8199 or Dave Snellman at (215) 345-4248. Club mailing address: P.O. Box 847, Havertown, PA 19053.

•The Downer's Grove (IL) Park District Museum sponsors a monthly "Collector's Hour." Participants have the opportunity to display collections at the facility for several weeks before making their individual presentations. The event is open to the public with no admission charge. The Museum has also begun to sponsor a yearly "Collector's Fair." For more info, contact Mark Harmon, The Downer's Grove Park District Museum, 831 Maple Ave., Downer's Grove, IL, 630-963-1309, fax 630-963-0496, mharmon@xnet.com.

•Houston Vintage Radio Association—Meets second Tuesday each month (except Jan. and Dec.) at Lai Lai Restaurant, Tides II Motel, Houston Medical Center, Main and Holcombe Sts., Houston, TX. Meetings include auction/program, 7-10 p.m. Assoc. publishes *Grid Leak* quarterly, monthly activity announcements. Membership $15/yr. Write: HVRA, P.O. Box 31276, Houston, TX 77231-1276, or call Richard Collins, (713) 778-0721.

•Hudson Valley Antique Radio & Phono Society—Meets third Thursday of month, 7 p.m. Meeting, swap meet, and membership info: Peter DeAngelo, President, HARPS, 25 Co. Rt. 51, Campbell Hall, NY 10916. (914) 496-5130.

•London Vintage Radio Club—This Ontario, Canada club meets in London on the last Saturday of January, March, May, June and November. Annual flea market held in Guelph, Ontario in September in conjunction with the Toronto club. Contact: Lloyd Swackhammer, VE3I1A, RR#2, Alma, Ontario, Canada. (519) 638-2827.

•Mid-Atlantic Radio Club—Meets monthly, usually the third Sunday of the month at the New

Hope Seventh Day Adventist Church, Burtonsville, MD. Contacts: President, Ed Lyon, 11301 Woodland Way, Myersville, MD 21773-9133, (301) 293-1773, e-mail lyon@fred.net or Membership Chair, Paul Farmer, (703) 960-0650, e-mail: oldradiotime@hotmail.com. Website www.maarc.org

•New Jersey Antique Radio Club—Meets second Friday each month, 7:30 p.m. Holds three annual swap meets. Contact (send SASE) Phil Vourtsis, 13 Cornell Pl., Manalapan, NJ 07726, (732) 446-2427.

•Northwest Vintage Radio Society—Meets second Saturday of each month (except July and August), at or about 10 a.m., at Abemathy Grange Hall, 15745 S. Harley Ave., Oregon City, OR. Members display radios, exchange information. Guests welcome at all meetings and functions, except board meetings. For info, write the Society at P.O. Box 82379, Portland, Oregon 97282-0379.

•Oklahoma Vintage Radio Collectors—Meets second Saturday each month, Hometown Buffet, 1012 S.W. 74th St., Oklahoma City, OK. Visitors welcome. Dinner/socializing, 6 p.m.; meeting at 7 p.m. Membership, $12/yr., includes monthly *Broadcast News*. Info: SASE to OKVRC, P.O. Box 50625, Midwest City, OK 73140-5625; or call (405) 755-4139 or (405) 732-6070; or e-mail fkarner@mmcable.com.

•Ottawa Vintage Radio Club—Meets monthly (except June and July) in Conference Room, *Ottawa Citizen*, 1101 Baxter Rd., Ottawa, Ontario. Contact: Tom Devey, 601-810 Edgeworth Ave., Ottawa, ON K2B 5L5, (613) 828-5152. Membership: $10 Canadian/yr.

•Pittsburgh Antique Radio Society welcomes visitors to our Saturday flea market/contests in March, June, September, and December. An auction is included in September, and our annual luncheon/program is held the first Saturday in December. Our newsletter, *The Pittsburgh Oscillator*, is published quarterly. website: www.nb.net/~schaefer/pars.html For directions, specific dates, information call President Bonnie Novak at 412-481-1563 or write to Karl Laurin, 8111 Sally, White Oak, PA 15131.

•Society for Preservation of Antique Radio Knowledge—Meets at 7:30 p.m. the second and fourth Tuesdays of each month in the party room at Cassano's Pizza Parlor, 1700 East Stroop Rd., Kettering, OH. Membership, $18/year. Write SPARK Inc, P.O. Box 292111, Kettering, OH 45429; e-mail sparkinc@juno.com or call John Pansing at (937) 299-9570.

•Texas Antique Radio Club—Meets alternate months in Kyle and Shertz, TZ. Contact: Ron Manning, President TARC, 133 East Huisache Ave., San Antonio, TX 78212. Phone (210) 734-6831; e-mail ronmeg@gateway.net; website www.gvtc.com/~edengel/TARC.htm

Service Sources Available

The AWA Source Sheet is a listing of parts suppliers and services for the radio collector. Cost: only a business-size self-addressed stamped envelope to AWA, Box E, Breesport, NY 14816.

AWA Slide/Video Program

The Antique Wireless Association has available several historical documentaries to loan to affiliated organizations for club meetings and programs. There is no charge for this service other than return mailing cost. For info on loan conditions, to make reservations, or just inquire, contact Ed Gable, Curator, AWA Electronic Communication Museum, 187 Lighthouse Rd., Hilton, NY 14468. The following are available:

VHS VIDEO PROGRAMS

V-2 — "Electrons on Parade." 18 min. 1938 movie made at RCA's Harrison Plant showing production lines with closeups showing receiving tubes, including a short sequence on transmitting tubes. (Very rare movie.)

V-4 — "The British Receiver." Documentary of the AWA/BVPS meet with visit to Marconi's Chelmsford plant, the British Science Museum, and ending with series of collectible British receivers. (VHS program transferred from slides.)

V-5 — "The Early Years." Historical documentary narrated by Clarence Tuska telling of the early years of amateur radio, founding of the ARRL and WWI military radio training school. (VHS program transferred from slides.)

V-6 — "The Key." History of the telegraph/radio key covering early hand keys, semi-automatics and commercial types. Script by Lou Moreau, W3WRE. (VHS program transferred from slides.)

V-9 — "The Transatlantic Tests and 1BCG." Rare documentary/photographs showing early amateur operation leading to famous 1921 transatlantic tests.

V-12 — "Those Wonderful Magazine Covers." The story of radio through magazine covers. Colorful with period music.

V-15 — "The WHAM Story." Details development of a pioneer radio station in Rochester, NY. Program developed with assistance and recollections of Art Kelly, the station's former general manager.

V-16 — "The Charles Herrold Story." Video prepared by Mike Adams who donated this copy

to the AWA. It documents the work of broadcasting's Forgotten Father who started broadcasting in 1912.

SLIDE PROGRAMS

S-1 — "Portrait of a Pioneer." The life of Elmo Pickerill.

S-2 — "Polar Adventure." Pictures taken by Bud Waite and his narration describing numerous trips to the Antarctic over a 35-year period.

S-3 — "70 Years of Vacuum Tubes." Describes the history of vacuum tubes.

S-4 — "The Early Years." (See description for V-5.)

S-7 — "The Transatlantic Tests and 1BCG." (See description for V-9.)

S-8 — "Trip Through the AWA Museum" Covers exhibits and equipment.

S-12 — "The Key." (See description for V-6.)

With the Chapters

There's been a lot going on in the Carolinas Chapter since I last reported to you. Both the 2001 Fall Swap Meet in Greensboro/Jamestown NC and the 2002 Winter Swap Meet in Columbia SC were very well attended. If they both continue to grow at this same rate we'll have to find larger locations soon. The CC-AWA Annual Conference, "The Spring Meet in the Carolinas" was without a doubt the biggest and best ever. The Conference started off with a bang on Thursday afternoon and evening with four GREAT programs. Tom Houghtling talked about restoring vintage TVs, Dennis Osborne told us about an area of collecting you may not have thought of before: Vintage Recording Equipment. Larry Dowell gave us a great tour of his collection and explained his particular areas of interest. And finally we were treated to a fantastic presentation by Buford Chidester about collecting Cone Speakers.

Friday morning's Flea Market started off with our normal "Le Mans Start" (which I see has now been copied by the Atlanta club for their Swap Meet). This was our biggest Flea Market ever I think. There were only about 10 or 15 empty spaces in the parking lot. Lots and lots of great radio goodies were for sale. Friday afternoon was really busy with TWO equipment auctions: a large collection of vintage military radio equipment followed by our regular "Old Equipment Auction." Among the really nice sets at the regular auction was a bunch of nice consoles that went at fairly cheap prices.

Friday evening we continued the banquet tradition that we started last year. And like last year it was followed by an open house reception for viewing the entries in the "Old Equipment Contest." Also open for viewing was a fantastic display of vintage items from our own pioneer broadcaster WBT. Along with lots of old broadcasting equipment that we rescued from the basement of the transmitter house there were photos and an incredible scale model of WBT's 1927 transmitter site that was built by my good friend Ted Miller. The conference continued Saturday morning with more Flea Market, the judging of the contest entries and our now-traditional end-of-meet Radio Rescue auction followed by a Members' Luncheon.

I would like to thank Paul Farmer for writing a great meet report for the MAARC's "Radio Age". All in all I think this was the best Spring Meet ever. It will be a hard act to follow. In early May we were again at the North Carolina Transportation Museum "Historic Spencer Shops" for our Spring Swap Meet, which was again well attended with lots of goodies. The week following the Spencer Meet we had a CC-AWA ExecComm meeting at Troutman's BBQ in Concord NC. Most of the meeting was taken up with discussing the Charlotte Conference and plans for next year. We also talked a good bit about our dream of establishing a radio museum. We had a position to fill on the board since the nominee for Vice President turned down the job after the election last fall. R.L. Barnett was nominated and approved by the committee to serve as interim VP until our next election which will be in 2003. Due to scheduling conflicts and a dramatic increase in site rental fees, we have canceled the Summer Swap Meet that was to take place in Raleigh NC in July. We're looking for another location for next year.

The next event on our calendar is the Fall Swap Meet in Greensboro/Jamestown NC on October 26th. For full details on this and any other CC-AWA event and lots of photos too, please visit our web page at CC-AWA.org. You are also invited to join the CC-AWA e-mail reflector, it's easy to do, just send a blank message to CC-AWA-subscribe@yahoogroups.com. That's all for this report from the Carolinas, take care and I hope to see you at one of our upcoming events. 73.

Ron Lawrence, KC4YOY
P.O. Box 3015, Matthews, NC 28106
704-289-1166 kc4yoy@trellis.net

MUSEUM NEWS

Visit us on the Internet at http://www.antiquewireless.org

MUSEUM CONTACT

For all inquiries about the Museum and its operation, contact Edward M. Gable, Curator, 187 Lighthouse Rd., Hilton, NY 14468. Phone: (716) 392-3088, e-mail: k2mp@eznet.net.

The AWA Electronic Communications Museum is an IRS 501(c)3 charitable organization.

From the Curator

Ed Gable, K2MP/W2AN

Greetings from your museum crew. We enjoyed bringing you the AWA Spring Meet at the annex, this year using an abbreviated dawn 'til noon schedule which seemed to work well. The annex sales were very successful and were a win-win for both seller and buyer. The interest in the sale of excess tube audio was underestimated and successful buyers of that commodity had to display good sprinting ability to get to the goodies first. It may be wise to go back to the auction format in future events to give equal opportunity to all.

On the afternoon of the Spring Meet there was a meeting of the museum board of trustees. Business was routine with no issues resulting from the various reports. Budget line items look good except for unplanned office expenses for copy machine and PC repairs

We discussed a new initiative concerning the timely purchasing of museum artifacts. On several occasions we've missed out on acquiring rare items for the lack of a plan and a pre-determined list of desired pieces. The trustees authorized the Curator to go forward and develop a process and to generate a procurement list. When approved this list will be made known to members who can both be on the look out for the desired items as well as have the opportunity to donate from their own collections.

Speaking of donations, they continue to come in on an almost weekly basis from not only individuals, but also industry and academia. I need to mention a lady who, upon hearing about the museum, called to inquire if we would like her dad's things. She said that, after graduating from engineering school in 1920, he immediately went to work for the radio division of RCA/Westinghouse and remained there for fifty years!

As she cleans out the house, she brings us boxes of wonderful early radio documentation and will continue doing so throughout the summer. It will take awhile to sort, but is a very exciting find. I'm sure no matter what your collecting specialty might be, you find it interesting to see how our European counterparts paralleled the development of wireless. AWA's long time friend and supporter Max DeHenseler, HB9RS, recently helped satisfy that curiosity. Max sent the museum a large and outstanding collection of odd EU style mineral detectors and headphones, most I'm sure never seen here before.

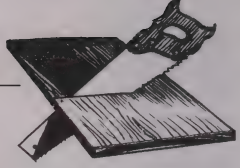
And on the subject of old friends, I share with you our loss and sorrow with the passing of Ralph O. Williams, Curator of the Atwater-Kent museum in Orient, NY, and long time guru of the AWA conference equipment contest.

Your museum is freshly open to the public and enjoying good visitation. A new and vigorous tourism bureau opened in nearby Canandaigua, NY, and is actively supporting tourism sites. They made arrangements for the museum to be highlighted on Channel 8 news, where I was interviewed for several minutes. That, combined

(continued on page 16)

BREADBOARDING

EDITED BY **RICHARD A. PARKS**, 2620 LAKE RIDGE CT., OAKTON, VA 22124
PLEASE INCLUDE SASE FOR REPLY.



Bring Historical Circuits to Life On Your Workbench!

Build a Simple Oscilloscope

Radio engineers were looking at electronic waveforms for many years before Philo T. Farnsworth got his cathode ray tubes working in about 1928. As early as the late 1890s, researchers were able to see images of low-frequency signals on oscillographs—contraptions involving tiny lamps and moving mirrors; frosted screens and photographic film could show higher-frequency waveforms. But sensitivity was low and stayed that way until amplification and the phosphorescent screen appeared.

The oscilloscope quickly became one of the most valuable instruments in the lab. Experimenters and hams adopted it as well: My 1939 Radio Amateur's Handbook gives a circuit ([1] and Fig. 1) for a one-inch 'scope. It used a 913 CRT resembling a 6L6, but having a glass screen at the end. By the following year, there were circuits for 2-inch and 3-inch scopes [2], [3]. Hams would use these simple units to monitor the performance of a 'phone transmitter by showing a trapezoidal representation of the modulation envelope.

The schematic representation of the 913 in Figure 1 shows a cathode and a couple of "grids," then an electrode shown as a heavy broken line. That's the second anode, which is ring-shaped. It is usually held at a high positive potential above the cathode, so that electrons can be accelerated through it and thence to the phosphor screen, where they create a lighted spot. The first grid controls intensity and the second grid can control the focusing of the spot.

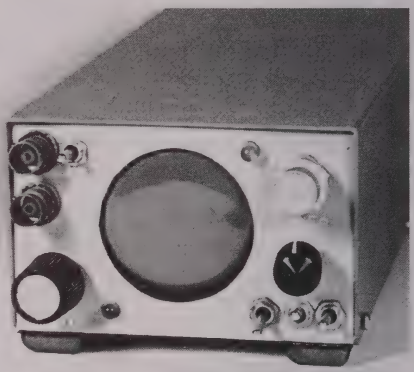


Figure 2. My briefcase-size scope utilized a type 902-A CRT.

The slanted plates above the anode are the electrostatic deflection plates; the spot can be made to move back and forth and up and down by changing the voltage on one or the other of the pairs of right-angled plates, attracting or repelling the electron beam. Current through the CRT is quite small—on the order of 20 or 30 microamperes. In this circuit, the second anode and one deflection plate in each of the two pairs are held at ground, while the cathode is actually highly negative, about -500 volts.

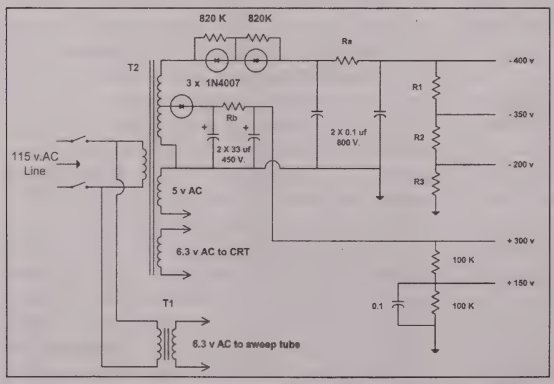


Figure 3. Schematic of power-supply section of our simple oscilloscope.

As it happens, I have acquired a few 902A scope tubes—two-inch CRTs with the P1 green phosphor we all know and love. They are happy with about 500 volts of B+, and fit into an octal socket. Some years ago I used a 902A in a briefcase-sized 'scope with transistorized sweep and vertical amplifiers (Figure 2).

I breadboarded this thing before building it, and in that form it spread over a 24 inch square piece

of plywood. In this and the next couple of columns I'll condense and improve those steps right here in public, but this time I'll stick with tubes all the way. You're invited to build one, too!

You can still find 902 CRTs—I got one at an AWA tube auction. Looking up their pinout (same as the 913) and operating characteristics, we find one side of the heater is tied to the cathode. A point to remember. And how about the sweep? To avoid distortion of the observed signal, we need to try to make the sweep voltage as linear as possible.

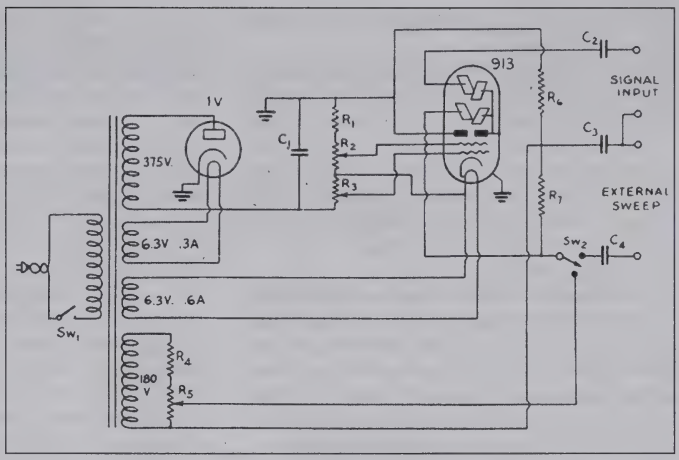


Figure 1. Oscilloscope circuit from 1939 Radio Amateur's Handbook.

I got out a text I used 40 years ago, and found a simple-looking thyratron/pentode circuit that can sweep almost 300 volts—plenty for the 902, which has a sweep sensitivity of 93 volts per inch. If we direct-couple to the horizontal deflection plate, that says the second anode of the 902 has to be somewhere around +150 volts for a centered sweep. We need a vertical amplifier so we can look at different kinds of signals; let's just use a single tube with high gain—maybe a 6AU6, and see if we can have DC coupling while we're at it.

All the above means that the power supply for our scope must deliver several different voltages: about -350 for the 902 cathode, -200 for the focus grid, sweep circuit, and amplifiers, and +150 for the second anode. To make matters more complicated, we'll use a 2D21 sweep tube, whose data sheet tells us its heater-cathode voltage has to be kept low. That means it gets its own 6 volt transformer.

We can get all the other voltages we need from a junked radio power transformer. Figure 3 shows the schematic for a power supply and its connections to the CRT.

T1 is the small transformer for the sweep tube heater. T2 is a typical radio power transformer. One I found in my junk box gives me 235 volts AC each side of center tap, plus two 2 amp windings, one at 5 volts and the other giving 6.3 volts. Two half-wave rectifiers make the high voltages: with one end of the HV secondary grounded, the center tap feeds a 1N4007 rectifier diode, making about + 330 volts across the input filter cap.

At the top of the secondary, a pair of 1N4007 series diodes connected backward will produce about -600 volts into the first 0.1 µF capacitor; the 0.1µF caps on my breadboard are rated at 800 volts. I'm using a pair of diodes because that way the peak inverse voltage gets to be higher than the 1000 volt rating of a single diode. The 820 K resistors ensure that each diode sees an equal share

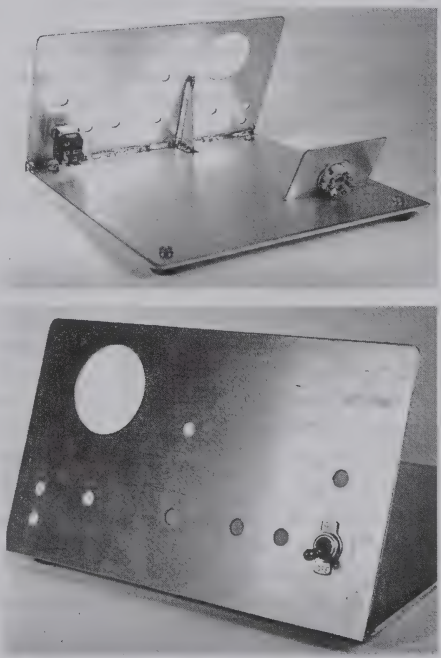


Fig. 4. Scope "breadboard" is constructed of copperclad PC board.

of inverse voltage during the positive-going half cycle from T2.

Adapting some other transformer for T2 can be done by adjusting the value of Ra in figure 2 so as to reach about -400 volts across the second 0.1 µF cap under the 1 milliamp load of the bleeder chain formed by R1, R2, and R3. In the same way, we can find the final value for Rb (between the two filter caps for the B+ supply) by adjusting it so that 300 volts appears on the second capacitor under load.

Until I run out of pieces of copperclad PC board, I'll keep using it for breadboarding. I cut a piece 9 1/2 by 10 inches and soldered a slanted panel about 5 1/2 inches high at the front after cutting all the holes I thought I would need. The layout keeps high-voltage parts toward the back, where they'll be covered with a shield later.

The breadboard, ready for mounting and wiring the parts, is shown as Figure 4. Note the octal socket and front-panel hole for the CRT. After putting the unit together I'll fire it up and adjust the values of the bleeder chain resistors to find and focus the little green spot. Then I'll tweak the supply output voltages, too, and take a look at how to move the spot around the screen. After that we'll get started on the sweep circuit.

REFERENCES

[1] Radio Amateur's Handbook, Sixteenth Edition, 1939, ARRL, Inc., Figure 1626, p. 388

[2] Radio Amateur's Handbook, Seventeenth Edition, 1940, ARRL, Inc., Figure 1732, p. 271 (2-inch)

[3] Radio Amateur's Handbook, Seventeenth Edition, 1940, ARRL, Inc., Figure 1734, p. 272 (3-inch)

MUSEUM NEWS, *continued from page 13*

with an opening news release to all area publications and radio and TV outlets, has helped put the AWA Electronic Communication Museum even more firmly on the map. Visitors are enjoying the new radiotelephone display, the improved Armstrong corner, a new Morse code display, and much more.

I'm delighted to introduce to you two new museum volunteers for our Tuesday work sessions: John Atwood, of Victor, NY and Jack Ruby of Syracuse. John is a retired RF engineer from Harris and Stromberg-Carlson and Jack is a well known lowfer, or VLF enthusiast. A new Museum guide this year is Bud Piscini, KD2WL. Take a look at the museum store offerings and notice the new AWA coffee mug! It is a heavy porcelain job in sturdy dishwasher- safe cobalt blue with yellow-gold printing. Get yours today. I'm looking forward to seeing a good crowd at the AWA Conference August 28-31, 2002. Come and celebrate our 50th year!

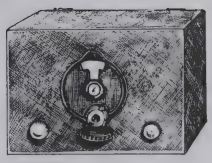
Ed Gable

Ed Gable K2MP/W2AN, Curator

RECENT MUSEUM DONORS

(compiled June 14, 2002)

Jerry Leaderthiel	Early Motorola police units, 1.7 MHz type
Hobart & Wm. Smith Colleges	Federal Telegraph TX Tubes, Hickock 6000, more
Bob Mast, W4AXR	1916 Dept Commerce list, 1917 QSTs, more
Jack Kramer	Misc. table radios, TV, HiFi gear
Mike Margolis, WB2RAZ	Heath Maurader + Warrior linear
Tony Prasil	WWII Morse keyer
John Atwood	End of production S-C hybrid car radio
Ann Parsons	Radiola 17
Leatrice Kemp	Archive quality RCA/Westinghouse documentation
Ann Taylor	Two table sets
Lorraine Chamberlain	Philco Cathedral type 44
Sidney Corderman, K2CML	Numerous pre-WWI wireless items, more
Max De Henseler, HB9RS	Nice collection of European Xtal detectors and headphones
Bob Roberts, WA2QAU	Display case for Armstrong artifacts
Ron Frisbie	Cash donation



2002 O.T. DX Contest Results
Participation Hits Five-Year High!

By Randy Haus, KB2PLW

A total of thirty-six AWA stations took part in the O.T. DX contest, making it the best-attended AWA DX contest in five years. As in previous years, fifties-era gear dominated the contest. Judging from the letters that you sent with your logs, many of you have the same fondness for the fifties that I do. It was a time in which the men who had stormed Iwo Jima and Normandy quietly painted their houses and took us fishing while the women who built thousands of tanks and aircraft made great dinners for us to come home to.

As kids, we instinctively knew that our parents were great, but we had no idea how great until many years later. This event provides a swell way to revisit the era of CONELRAD, Civil Defense and "Return of the Creature" movies.

Anyway, the event went well, with relatively little QRM from major contests. While I personally did not get on the air as much as I would have liked, I did notice that scores were generally higher in addition to the larger number of participants.

As with last year's event, Sven Hed, SM4DIG held up the DX end of the contest, providing many contacts for the rest of us. Congratulations and thanks for a job well done.

High scorer for the event was Harry Blesy, N9CQX, of Hinsdale, Illinois. Harry went all out for a score of 342 points using a 1959 Hallicrafters HT-37 and a 1955 Collins 75A4. As they say in Podunk Hollow, "Holy cow!"

On a somber note, participant Bob McGraw, W2LYH became a silent key before this contest could be reported. Bob was a kind man, who through his QST articles and personal advice, guided thousands of young hams. Research done by ARRL headquarters staff shows that Bob was a regular contributor to QST from 1947 through 1984. He was a first rate craftsman and exemplary operator. I will miss our yearly AWA contacts.

Here is a breakdown of the scores:

EASTERN ZONE

Station	Points	TX	RX
W1DDW	54	1940 MOPA	Mod
K1FI	68	Mod	1946 HRO
W1FPZ	84	1938 Homebrew	1955 Collins
K1GDH	168	1955 Johnson	1954 National NC300
NE1S	75	1949 Viking	1953 R390
W1YT	36	1955 Johnson	1946 Hammarlund
KB2E	66	1959 Hallicrafters	1955 Hallicrafters
K2KK	61	1955 Johnson	Mod
W2LID	19	Mod	Mod
W2LYH	210	1936 6V6-6L6	1936 Homebrew
KE2O	26	Mod	Mod
KB2PLW	38	Mod	1943 BC348
W2RS	144	1959 KWM-2	1958 Collins 75S1
N2VO	27	Mod QRP	Mod
W2YIK	52	Mod	Mod
W3CNS	48	1959 National NCX5	1959 National NCX5
W3VVS	10	Mod	Mod

Station	Points	TX	RX
W5WS/3	54	1938 6L6	Mod
N4AWA	20	Mod	Mod
W4FRM	0	AWA Listening Post	BC-312
K8JWR	90	1957 Heathkit DX35	1957 Hammarlund
WD8OFB	9	1939 6L6	1959 Hammarlund
W8ZNX	48	50s Homebrew 955	Collins 75S1
N9CQX	342	1959 Hallicrafters	1955 Collins 75A4
AA9DH	315	1948 Hallicrafters	1945 Hammarlund
N9TT	6	1955 Globe Scout	1937 BC312
K9VKY	58	1950s Collins S line	same
VA3RSA	126	1958 Heathkit DX40	1941 Homebrew
WESTERN ZONE			
AC5AM	258	1958 Heathkit DX40	1938 Hallicrafters SX 16
K5RB	168	1952 Elmac AF67	National SW3
W8KGI/5	99	1958 CE 100 V	1949 HRO
K6TQ	261	1938 6L6/807	1936 National HRO
W6TDP	120	1937 Utah UAT1	1939 Hammarlund
W7LNG	20	1955 Johnson Ranger	Mod
KB0ROB	45	Mod	Mod
DX ZONE			
SM4DIG	90	Mod	Mod

LETTERS, *continued from page 7*

The sale brought in *significant* income for Ted's family, and there are enough good things left over that we may try this again next year. Watch for our next ad in *The OTB*, featuring bargain prices! Incidentally, if the lady from Roanoke who bought the Radiola II acquired from the Ford museum reads this, we've found the museum's accession number and bidder's number for the set as well as a schematic and data sheets. With the accession number she can contact the museum and ask for a history of the set. These are hers if she would contact Shirley at (540) 721-1222.

LARRY BABCOCK
East Amherst, NY

A 12SK7 MEETS ITS MAKER

My kid sister Francie was visiting me in Bloomfield recently and I gave her a tour of the museum and annex. The subject of the RCA Harrison Receiving Tube Works happened to come up, and out of the blue Francie mentioned that she had made 12SK7s there in 1945, She rode the Lackawanna to Harrison and rollerskated to her workplace to get there on time. At this point, Curator Ed Gable suddenly disappeared only to reappear moments later with a 12SK7 and a camera. Here's the picture, and nobody can prove that this was not one of the actual 12SK7s that Francie had produced over a half-century before.

THOMAS S. ELY, M.D.
Bloomfield, NY

Radio Reproducers

EDITED BY **DAVE CROCKER**, 35 SANTUIT POND RD., #4B, MASHPEE, MA 02649
PLEASE INCLUDE SASE FOR REPLY.

The Crosley Magfon

When most collectors think of Crosley speakers, they almost always believe that the firm's line started with the green and gold "Musicone" paper-cone units. These were manufactured in three sizes in 1925 and 1926. The Musicone speakers were followed by the metal-encased "Dynacones" of 1927. Crosley seems to have totally avoided the traditional horn-shaped speakers of the time.

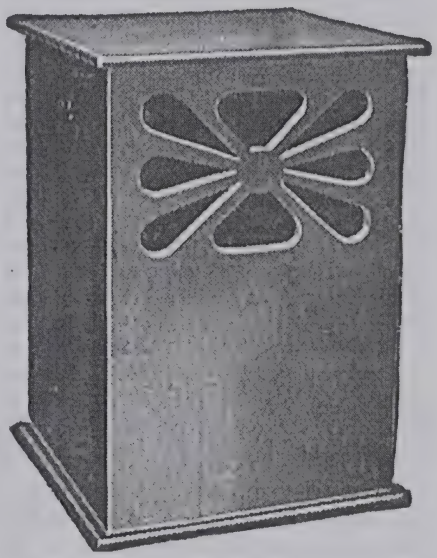
However, looking way back to June of 1921, we find that Crosley had ventured into producing a type of horn speaker called the "Magfon." It wasn't very big, it wasn't very successful, and it wasn't on the market for very long.

The short-lived Magfon was neither a graceful swan-neck nor a trumpet type of horn. It was, in fact, a simple box with a starburst grille. The "antique mahogany" cabinet stood a mere 12" tall, and was only 8" wide and deep. It came without a driver device, and it was suggested the purchaser obtain a "...suitable watch-case receiver" (headphone unit) for operation.

The owner would slide this up through a small opening in the lower back and onto a short, fabricated, tapered cone. The unit was a simple sound-amplifying chamber. The cone bounced the sound around inside the cabinet, making it only slightly louder than the original, but acceptable nevertheless.

This sound chamber effect was used later, in Crosley's Model XL receiver of 1924 (Crosley's competition for the RCA Model IV). The XL cabinet had two doors with grilles and grille cloth. To the left was a 4-tube receiver (actually a Model XJ, re-configured to a square format). To the right was the sound chamber...again offered without a reproducer.

Crosley mentioned that the Magfon' s quality of reproduction depended on the type of watch-case receiver used, and suggested the use of a Baldwin or Western Electric type. It was also stated that the device was not intended for use with crystal radio reception, but for sets operating with one or more "Audion tubes."



The Crosley Magfon speaker of 1921.

An internal amplifying "horn" from the Model XL receiver. Similar to the one in the Magfon unit, it consists of a short, tin horn glued to a wooden back section stamped "CROSLEY." The device is painted metallic silver.

Crosley's sales pitch in 1921 was that there was "…no need for a group of listeners to take turns with headphones to enjoy radio broadcasting," and the $10 price tag competed with some headphones of the time. But, alas, the radio public didn't go for it, and the Magfon vanished into obscurity. Vanished isn't the word, because in my 26 years of Crosley collecting, I have never seen one…so if any collectors out there have one, please let me know.

About Our **Feature Article Authors**

JOSEPH BRAUNBECK

Cold War and Hot Crystal Radios: Vienna in the Early Fifties

Born in 1933, Joseph Braunbeck grew up in Vienna, Austria and attended school at a time when the Nazi lawmakers decreed the death penalty for transmitting "regardless of age." Ignorant of this danger, he built crystal radios and spark transmitters as a nine-year-old. Joseph studied physics at the Vienna University of Technology and did his doctor's thesis at the Infrared Laboratory of Perkin-Elmer Corporation. He later worked on Lasers and Nuclear Magnetic Resonance at the Varian Research Laboratory, Zurich, Switzerland, then became head of Telefunken's Special Projects Laboratory in Konstanz, Lake Constance. During his career, Joseph had developed a strong interest in the history of science and technology. In 1973, he joined the staff of the Museum of Industry and Technology on Vienna, Austria and a few years later began teaching history of communication technology at Vienna University of Technology. Now retired from the museum, he authors books dealing with little-known areas of the history of science & technology. His *Der Strahlende Doppeladler*, on the history of the Austrian Nuclear Industry before 1918, appeared in 1996. He has just has finished a book on the life of Felix Ehrenhaft, Albert Einstein's friend and colleague.

WILLIAM B. FIZETTE

A Structured Approach to Fixing Up Those Nice Old Radios, Part 10—Restoration of a Meissner 8-tube "Combination" Kit Receiver (continued)

Bill is AWA's current president as well as Editor of *The OTB*'s "The Communication Receiver" column. His Bio appears in the February, 2000 issue.

HOWARD HOLDEN, WB2AWQ

Evolution of a 1921 RAC Transmitter

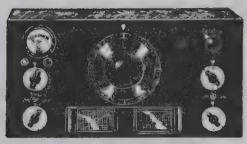
Howard was first licensed in 1962 as WN2AWQ and has been active in ham radio since then. His interests are in transmitter hunting; CW; collecting, restoring and operating old radios; and homebrewing, with a particular fondness for old style breadboard radios to be used in the AWA "Olde Tyme" contests. He is newsletter editor, call sign trustee and primary repeater maintainer for the 10-70 Repeater Assn, Inc in Northern NJ, and holds four commercial FCC licenses - GMDSS Operator, GMDSS Maintainer, General Radiotelephone, and T-2 Radiotelegraph. He served in the US Navy as a CW operator and traffic supervisor, and has been employed for over 20 years by a small manufacturer of instrumentation level motors, generators, encoders, and brushless commutation devices. Howard enjoys working aboard the WW2 submarine USS *Ling*, and resides with his bear-collecting Wife Susan, three sons—including Ken KB2SFS/AWA—and a very spoiled Daschund in Wanaque, NJ.

ARTHUR E. ZIMMERMAN, PH.D.

The First Wireless Time Signals to Ships at Sea

Arthur grew up in Toronto listening to radio at the end of the Canadian Broadcasting Corporation's "Golden Age" and has always been fascinated by the wonderful pictures that radio can create in the mind. During and after his years as Professor of Human Physiology at Queen's University, Kingston, Ontario, he was associated with the Queen's radio stations, CFRC and CFRC-FM, producing, operating and announcing classical music, public affairs and drama programs and serving as Program Director from 1984-1988. Arthur broadcast on CFMX-FM and CKWS-AM and -TV in Southern Ontario and served as host/writer of CBC's "Mostly Music" in 1984. He has written program notes for the Pearl and Mastersound CD labels. His award-winning Queen's Radio Oral History Project of 1982, celebrating 60 years of broadcasting from the Queen's campus, was expanded into a thoroughly documented book, "In the Shadow of the Shield," in 1991. A long-time member of AWA, he continues his meticulous research work in radio history, and is nearing completion of his painstaking study on the origins of pioneering Marconi public broadcasting stations XWA/CFCF, Montreal, and CHCB, Toronto.

The Communications Receiver



EDITED BY **WILLIAM FIZETTE, W2DGB**, RR 1, BOX 55, HENRYVILLE, PA 18332
PLEASE INCLUDE SASE FOR REPLY.

The Scott SLR-M: A Wartime Entertainment and Communications Receiver

This receiver was designed for general coverage reception (entertainment and news) on smaller merchant ships during World War II. It is an interesting hybrid in that, because of its BFO circuit, it could also function as a communications receiver.

I was fortunate enough to acquire this radio a few years ago, and was impressed with some of its unusual features. First, while most Scott marine receivers were truly boat anchors, this set used aluminum for the chassis, panel and cabinet, making it considerably lighter than expected. Next, because of its AC-DC circuit, the only "iron" in the set was the massive multiple-winding output transformer and the filter choke.

Besides the fact that this particular set had been well cared for and was in almost mint condition, its general appearance was imposing. The predominant light gray color contrasted nicely with the red ID plate and the black controls. Finally, the SLR-M is a good example of patented radio technology: the low-radiation receiver.

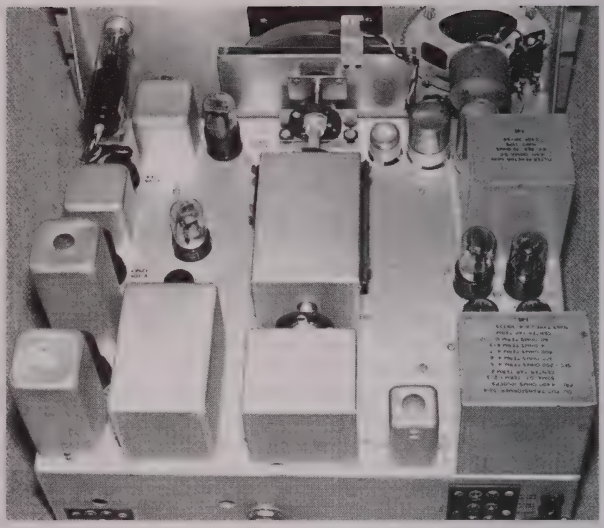
An excellent article on the various E.H. Scott low-radiation marine receivers of WW II, written by Dr. John T. Meredith, was published in the November, 1992 *OTB*, in the Communication Receiver column. It is recommended reading for anyone interested in Scott radios, and was used as

The SLR-M removed from the cabinet. Note the monitor speaker, the tuning eye tube, and the massive main dial.

a source for some of the material that follows.

Another good and very comprehensive information source for all the Scott radios, including the military sets of World War II, is the lead article in *The AWA Review*, Volume 11. It was written by Kent King, the Secretary of the E.H. Scott Historical Society.

Meredith makes the point that this is probably the finest AC-DC radio ever made, and an inspection of the circuit and construction appears to confirm that. The quality of components is superb. After all, it was built to government specifications, probably on a cost-plus contract.



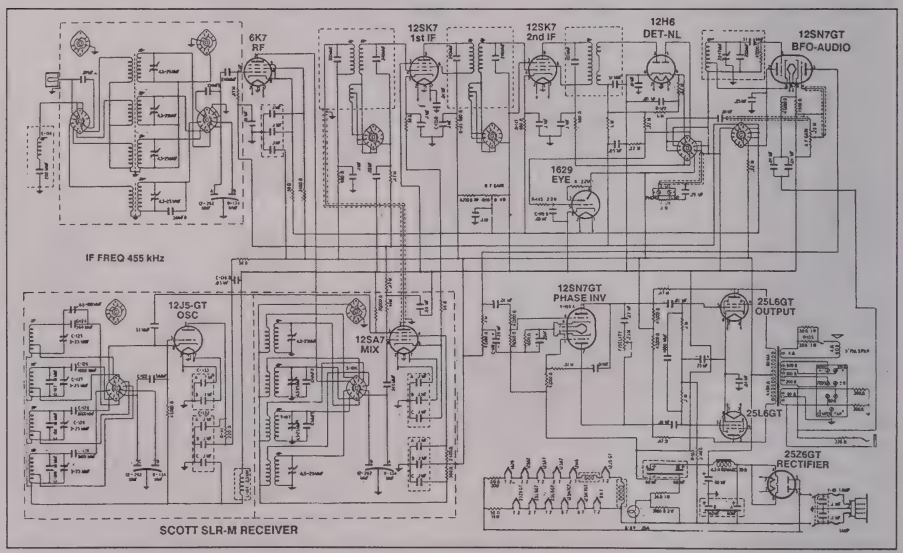
Here's a look at the top of the chassis. The three boxes in the center house the RF, mixer, and oscillator circuits. The audio output transformer is at the right rear.

This is another example of a radio that flatly contradicts the concept that AC-DC radios are "cheap." We have here a twelve-tube receiver, with communications capability and state-of-the-art circuitry, which was designed with a power supply that would work with the DC mains still found on many of the ships in the 1940s.

The two photos show the receiver removed from the cabinet. Looking at the front panel, the gain and fidelity controls are to the left of the main tuning knob, and the band selector, noise limiter/phone selector, and selectivity switches are on the right. The BFO and tuning eye on the upper right are balanced by the power and speaker switches and the monitor speaker on the upper left. A headphone jack is included.

The receiver covers 0.54 to 1.6 MHz 1.36 to

(continued on page 26)



The circuit diagram of the SLR-M. Note the complex audio and power circuits.

BY JOSEPH BRAUNBECK

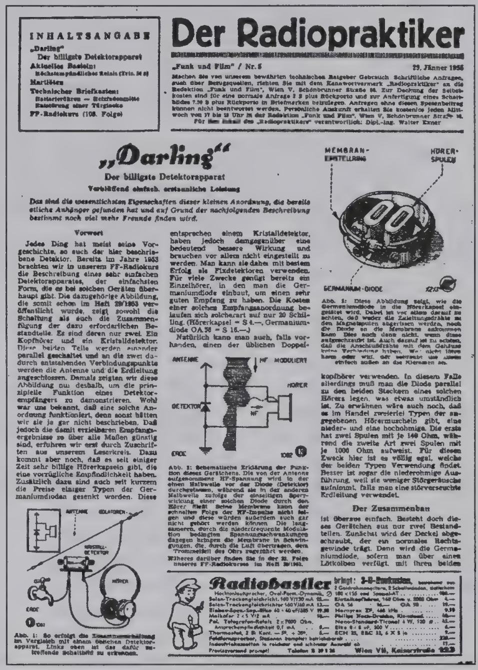
Cold War and Hot Crystal Radios: Vienna In the Early Fifties

Historical Background

Austria became involved in World War II the year before it started. During the evening of March 11, 1938 German troops crossed the Austrian Border. Austria became a so-called "Ostmark" (German Province), and remained so for seven years to come.

The spring of 1945 brought not only the end of World War II, but also the end of the "Ostmark." On March 29, 1945, Soviet troops entered Austrian Territory and headed for Vienna. The battle of Vienna lasted from April 4 to April 13. On April 28, the Seventh U.S. Army crossed the Austrian Border in the western part of the Tyrol. The French First Army followed on April 30, and British Troops arrived on May 8 over the Italian-Austrian border. On April 27 the provisional government proclaimed the Republic of Austria.

On July 4, the four allies agreed on the zones of occupation. The situation in Vienna, the capital of Austria, initially was very similar to that of Berlin. Vienna was surrounded by the Soviet zone, and divided into four sectors. The Western Allies entered their sectors in August, 1945. As every tourist knows, the center of Vienna with its historical buildings became the "International Sector" with a monthly change of occupation troops.


INHALTSANGABE
„Darling"
Der billigste Detektorapparat
Aktuelles Basteln:
Höchstempfindliches Relais
Technischer Briefkasten:
Entstörung einer Türglocke
FF-Radiokurs (108. Folge)

Der Radiopraktiker

„Funk und Film" / Nr. 5 — 29. Jänner 1955

Machen Sie von unserem bewährten technischen Ratgeber Gebrauch. Schriftliche Anfragen, auch über Bezugsquellen, richten Sie mit dem Kennwortvermerk „Radiopraktiker" an die Redaktion „Funk und Film", Wien V, Schönbrunner Straße 58. Zur Deckung der Selbstkosten sind für eine normale Anfrage 2 S plus Rückporto und zur Anfertigung eines Schaltbildes 7.50 S plus Rückporto in Briefmarken beizulegen. Anfragen ohne diesen Spesenbeitrag können nicht beantwortet werden. Persönliche Auskunft erhalten Sie kostenlos jeden Mittwoch von 17 bis 18 Uhr in der Redaktion „Funk und Film", Wien V, Schönbrunner Straße 58.
Für den Inhalt des „Radiopraktikers" verantwortlich: Dipl.-Ing. Walter Exner

„Darling"
Der billigste Detektorapparat
Verblüffend einfach, erstaunliche Leistung

Das sind die wesentlichsten Eigenschaften dieser kleinen Anordnung, die bereits etliche Anhänger gefunden hat und auf Grund der nachfolgenden Beschreibung bestimmt noch viel mehr Freunde finden wird.

Vorwort

Jedes Ding hat meist seine Vorgeschichte, so auch der hier beschriebene Detektor. Bereits im Jahre 1953 brachten wir in unserem FF-Radiokurs die Beschreibung eines sehr einfachen Detektorapparates, der einfachsten Form, die es bei solchen Geräten überhaupt gibt. Die dazugehörige Abbildung, die somit schon im Heft 29/1953 veröffentlicht wurde, zeigt sowohl die Schaltung als auch die Zusammenfügung der dazu erforderlichen Bestandteile. Es sind deren nur zwei. Ein Kopfhörer und ein Kristalldetektor. Diese beiden Teile werden einander parallel geschaltet und an die zwei dadurch entstehenden Verbindungspunkte werden die Antenne und die Erdleitung angeschlossen. Damals zeigten wir diese Abbildung nur deshalb, um die prinzipielle Funktion eines Detektorempfängers zu demonstrieren. Wohl war uns bekannt, daß eine solche Anordnung funktioniert, denn sonst hätten wir sie ja gar nicht beschrieben. Daß jedoch die damit erzielbaren Empfangsergebnisse so über alle Maßen günstig sind, erfuhren wir erst durch Zuschriften aus unserem Leserkreis. Dazu kommt aber noch, daß es seit einiger Zeit sehr billige Hörerkapseln gibt, die eine vorzügliche Empfindlichkeit haben. Zusätzlich dazu sind auch seit kurzem die Preise einiger Typen der Germaniumdioden gesenkt worden. Diese entsprechen einem Kristalldetektor, haben jedoch demgegenüber eine bedeutend bessere Wirkung und brauchen vor allem nicht eingestellt zu werden. Man kann sie daher mit bestem Erfolg als Fixdetektoren verwenden. Für viele Zwecke genügt bereits ein Einzelhörer, in den man die Germaniumdiode einbaut, um einen sehr guten Empfang zu haben. Die Kosten einer solchen Empfangsanordnung belaufen sich solcherart auf nur 20 Schilling. (Hörerkapsel = S 4.—, Germaniumdiode OA 56 = S 16.—)

Natürlich kann man auch, falls vorhanden, einen der üblichen Doppelkopfhörer verwenden. In diesem Falle allerdings muß man die Diode parallel zu den beiden Steckern eines solchen Hörers legen, was etwas umständlich ist. Zu erwähnen wäre auch noch, daß es im Handel zweierlei Typen der angegebenen Hörermuscheln gibt, eine nieder- und eine hochohmige. Die erste hat zwei Spulen mit je 140 Ohm, während die zweite Art zwei Spulen mit je 1000 Ohm aufweist. Für diesen Zweck hier ist es völlig egal, welche der beiden Typen Verwendung findet. Besser ist sogar die niederohmige Ausführung, weil sie weniger Störgeräusche aufnimmt, falls man eine störverseuchte Erdleitung verwendet.

Der Zusammenbau

ist überaus einfach. Besteht doch dieses Gerätchen aus nur zwei Bestandteilen. Zunächst wird der Deckel abgeschraubt, der ein normales Rechtsgewinde trägt. Dann wird die Germaniumdiode, sofern man über einen Lötkolben verfügt, mit ihren beiden

Abb. 1: So erfolgt die Zusammenschaltung im Vergleich mit einem üblichen Detektorapparat. Links oben ist das dafür zutreffende Schaltbild zu erkennen.

Abb. 2: Schematische Erklärung der Funktion dieses Gerätchens. Die von der Antenne aufgenommene HF-Spannung wird in der einen Halbwelle vor der Diode (Detektor) durchgelassen, während sie in der anderen Halbwelle zufolge der einseitigen Sperrwirkung einer solchen Diode durch den Hörer fließt. Seine Membrane kann der schnellen Folge der HF-Impulse nicht folgen und diese würden außerdem auch gar nicht gehört werden können. Die langsameren, durch die niederfrequente Modulation bedingten Spannungsschwankungen dagegen bringen die Membrane in Schwingungen, die, durch die Luft übertragen, dem Trommelfell des Ohrs zugeführt werden.
Näheres darüber finden Sie in der 22. Folge unseres FF-Radiokurses im Heft 29/1953.

Abb. 3: Diese Abbildung zeigt, wie die Germaniumdiode in die Hörerkapsel eingelötet wird. Dabei ist vor allem darauf zu achten, daß weder die Zuleitungsdrähte zu den Magnetspulen abgerissen werden, noch die Diode an die Membrane ankommen kann. Dies auch dann nicht, wenn diese aufgeschraubt ist. Auch darauf ist zu achten, daß die Anschlußdrähte mit dem Gehäuse keine Verbindung haben. [illegible] einfach außen an die Klemmen an.

The original "Darling" article as it appeared in the January 29, 1955 issue of Funk Und Film.

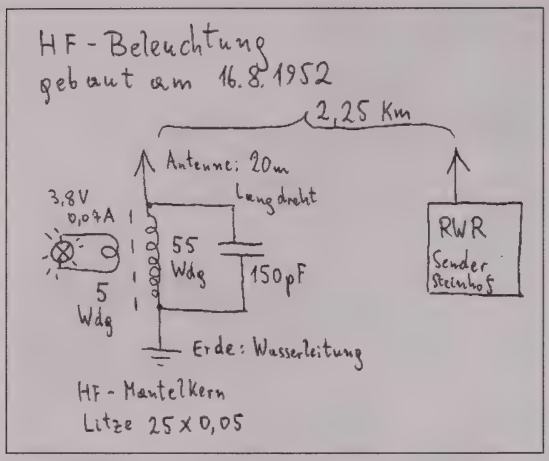
After the end of World War II, the relationship between the Western Allies and the Soviet Union began to deteriorate. From June 24, 1948 to May 12, 1949, the Soviets blocked all road and rail connections between West Germany and the three western zones of Berlin. The US Air Force and British Royal Air Force airlifted in something like two megatons of supplies during those months. Though there was never a Vienna crisis similar to the Berlin crisis, the cold war raged in this city as well. The state of occupation ended on May 15, 1955, when the four Allies and Austria signed the State Treaty. The treaty prohibited the forming of a union between Austria and Germany, denied Austria the right to own or manufacture nuclear weapons or guided missiles, and obligated Austria to give the USSR part of its crude oil output for years to come.

All four former allies withdrew their troops from Austrian territory within a few months.

Cold Radio War in Vienna

In the course of the battle for Vienna, the withdrawing German army blew up the transmitting site of Radio Vienna on April 13, 1945. On April 29, technicians of Radio Vienna managed

P.O. BOX 36, A-1142 VIENNA, AUSTRIA, EUROPEAN UNION



Original sketch for radio-powered lamp. Anonymous contributor is still embarrassed about the power he "stole" from U.S. taxpayers.

to be on the air again with two homebrew transmitters radiating just a few watts. The following day Radio Vienna was on the air for five hours.

On May 31, an improved homebrew transmitter powered a temporary antenna on the roof of the studio building with an unbelievable 1200 watts. This transmitter could be heard all over Vienna. Its only drawback was that, like the studio, it stood in the Soviet sector. On June 7, 1945 by order of the Soviet headquarters, Radio Vienna had to transmit a "Russian Hour" daily. As a countermeasure, the western Allies used their votes in the Allied Council to introduce the "Hour of the Allies." This was transmitted by radio stations all over Austria, giving all four Allies a chance to reach the population.

In the meantime, a young company named Frequentis, now a major manufacturer in the European Union, built a 10 kilowatt transmitter in the French sector. Transmissions of "Wien II" ("Vienna Two") started one day before Christmas Eve, 1945. In the US Zone of Austria, the US Information Service established the service "Rot-Weiss-Rot" (Red-White-Red), an allusion to the Austrian flag. The ten-kilowatt transmitter was situated on the fringe of the city, but still safely inside the US zone, between the world famous vineyards of Grinzing.

In Grinzing the US army also operated a one kilowatt transmitter. The "Blue Danube Network, abbreviated "BDN," transmitted in English. Officially intended for American GIs, it had a much larger audience. For the young generation in Austria., BDN was an acoustical gate to the western world.

The British called their radio agency "Alpenland" ("Alpine Country"). They began transmitting with the power of one kilowatt, from their headquarters in historical Schoenbrunn palace, on March 1, 1948.

So, by 1948 there were five radio stations operating within the residential area of Vienna—a situation quite new to the Viennese, who had to be content with one local radio station ever since broadcasting started a quarter century earlier. Both sides began to wage a propaganda war fought with words and songs.

The hostilities escalated on August 5, 1949, when the British Forces changed the frequency of their station "Alpenland" from 1285 kHz to 565 kHz. Now "Wien I," which transmitted from the soviet sector on 592 kHz, could not be received in a large area of the Western zones.

The Austrian government was not happy with this state of affairs. Though Wien I was required to transmit Soviet propaganda for a considerable fraction of its on-the-air time, it was still the official radio station of the Austrian capital.

The Austrian government agencies involved initiated a protest. The polite but meaningless answering letter is preserved in the Austrian State Archive:

ACTING CHIEF SECRETARY,
HEADQUARTERS
ALLIED COMMISSION FOR AUSTRIA
(BRITISH ELEMENT)
VIENNA
BRITISH TROOPS IN AUSTRIA

SEC 7821
16th September, 1949

Sir,
I am instructed to acknowledge receipt of your letter B.M.Zl.426401949 of the 30th August, 1949, concerning the Schoenbrunn Transmitter.
I have the honour to be,
Sir, Your obedient Servant,
(illegible signature)

The British "Alpenland" station remained on 565 kHz, only 27 kHz away from "Wien I." The situation escalated on March 15, 1950, when the Kopenhagen plan for the distribution of European broadcasting frequencies became effective.

Locations of "cold war" transmitters in Vienna, 1952.

Now "Wien I" was on 584 kHz and "Alpenland" moved to 566 kHz, a mere 18 kHz away. On this day, the power of "Wien I" was increased to 35 kW. So far the cold radio war was between Great Britain and the Soviet Union.

The US Information Service does not seem to have thought much of this of frequency jostling. Instead they built their already-mentioned new transmitter in Vienna's French Zone. Two huge transmitting towers were erected in a residential suburb. On January 26, 1952 the "Rot-Weiss-Rot" station began to transmit on 755 kHz with a power of 120 kW. The perimeter of the installation was guarded by US marines. This powerful transmitter, located in an area of relatively high population density, remained in operation until the end of allied occupation on July 26, 1955.

Hot Crystal Radios

During those years of "cold radio war," practically every house in Vienna had a powerful medium wave transmitter nearby. Field strengths were overwhelming. Crystal radios worked wonderfully well. By a lucky coincidence those also were the years when germanium diodes appeared on the market, becoming cheaper and cheaper like the computer chips of our days.

Of course best results were obtained by those living not too far from the "Rot-Weiss-Rot" transmitter operated by the US Army. With a suitable antenna, loudspeaker reception was no problem in much of the city. Some experimenters enjoyed getting something for nothing by having setting up radio powered lamps. Best results were obtained by using bicycle tail light bulbs, which drew approximately a quarter of a watt. Other hobbyists preferred small neon bulbs.

The author has succeeded in obtaining a copy of the original sketch for a "radio lamp" from an experimenter of those days. Now an elderly gentleman, this constructor wishes to stay anonymous. He has a troubled conscience because of having "stolen" electrical energy paid for by United States taxpayers—especially since he later became a US citizen.

The most remarkable crystal radio of that time was the "Darling." It was conceived by the editorial staff of *Funk und Film*, a weekly magazine of radio and movie news. The idea for the "Darling" came when the price for germanium diodes dropped to ATS 16.00, which is about US $5.60

in the buying power of the year 2000. There were also ex German Army single earphones on the market for ATS 4.00 (US $1.40).

That was all one that was needed for building the radio. One connected the germanium diode in parallel to the earphone coils and construction work was finished. Antenna and earth were connected to the earphone terminals. Holding the earth wire in one hand and throwing out a few yards of antenna wire resulted in perfect reception of a nearby station.

This simple device was the first truly portable radio available to all, from schoolboys to old age pensioners. Soon after publication in the January 19, 1955 issue of "Funk und Film," 10.000 of those single ear phones had been sold. In addition, there was a serious shortage of germanium diodes, which lasted for several months. With transistor radios still beyond the reach of ordinary enthusiasts, the "Darling" became the great grandfather of the Walkman.

"The more there were, the less there are." This old collector's rule applies to the "Darling" also. Genuine examples are rarities hardly ever found in Vienna's flea markets. The author wishes to thank the Austrian State Archive, especially Mr. Herbert Vopava, for the valuable help in compiling historical material on this subject.

COMMUNICATIONS RECEIVER, *continued from page 22*

18.6 MHz in four bands. A distinctive feature of the Scott SLR (Super Low Radiation) series of marine receivers, including the SLR-M, is the combination of mechanical and circuit design improvements that attenuated radiation of the oscillator signal. Marvin Hobbs, Scott's design engineer, received a U.S. Patent on these improvements in 1943.

The antenna coils at the rear of the chassis are totally shielded, with even the coil switch shaft broken by an insulated coupling. The mixer and oscillator tubes and circuits are also enclosed. The metal 6K7 RF tube bridges between the two compartments, and shielded RF filters in the filament and HV lines complete the isolation. The result was that there was no detectible radiation beyond 25 feet, fulfilling the design requirements.

As received, the radio did not work, and my goal here was to restore this set to working condition while leaving the original components in place and doing as little modification as possible. A check of several of the electrolytic capacitors revealed that they were non-functional, and all would have to be replaced. The filter circuits are somewhat complex, and I studied the diagram carefully before proceeding.

Good exact replacements were not available, so I used the usual restorer's trick of wiring in small modern cartridge filters under the chassis—leaving the disconnected originals in place above the chassis. The new capacitors were mounted on small fiber stand offs soldered to the original terminals. The tubes checked out, and with the replacement of a couple of the original by-pass capacitors, the radio came alive. No alignment was found necessary, the components having stood the test of time.

The five-inch PM monitor speaker sounded distorted, and will probably have to reworked by one of the several speaker folks who do that sort of thing. While modern replacement speakers are plentiful, I elected to leave this one in, as it is of the highest quality and the construction is very distinctive. It is very rugged, and it a prominent part of the radio. A large Hallicrafters speaker sitting on top serves nicely for the time being.

The tuning was somewhat loose and, without bandspread, was critical for SSB and CW reception. Sensitivity was a bit low, but without careful antenna matching, and considering the mid-1930s technology and components, this was not surprising. The push-pull 25L6 audio-output, even with the low voltage of the AC-DC circuit, provided a respectable 1.5 Watts, enough to operate several external speakers.

Thousands of these radios were ordered during the war, and with the end of hostilities in 1945, many came on the surplus market. Included were many that were unused, and since Scott was left holding an inventory of new sets when the contract was canceled, it is likely that these also ended up in war surplus. Some years back the Scott WWII SLR radios were commonly seen at hamfests, but now they are a rare sight indeed. If one does show up, the price can be high. The Navy version of this receiver is known as the REE.

If you are a collector of military radios, one of the Scott SLR sets is a must. The sets represent a significant design accomplishment that met a perceived need during the very critical Battle of the Atlantic—a battle, incidentally, that was almost won by the Axis.

HOWARD F. HOLDEN, WB2AWQ

EVOLUTION OF A 1921 RAC TRANSMITTER

My wife is to blame for this. It was she who gave me the *QST Magazine* Compact Disc set covering 1915 to 1929 several years ago. The 1921 issues seemed to have a plethora of interesting transmitter circuits. The one which first caught my eye was an article by E.W. Whittier, 1DH, [1] titled "A Sure-Fire CW Circuit." In that article Whittier used a pair of UV-202 triodes in parallel in an oscillator circuit which I had not seen before. It just so happened that I had recently purchased a pair of beautiful UV-202s from a well-known collector. I was anxious to see my babies in action.

I proceeded to build Whittier's circuit, using link coupling instead of direct antenna coupling, and making adjustments to cover 80 meters instead of the 200+-meter frequencies used in 1921. Much to my dismay the rig would not oscillate, except for a very weak spurious oscillation on 12 MHz, despite all manner of tinkering and alterations.

Shortly after I stumbled across a similar circuit in *The Radio Manual* [2] and discovered that the circuit was a "Meissner oscillator," which used antenna capacitance and tank coil inductance for frequency control. I had been putting the output through a tuner into an end fed half wave wire, and my perception was that very little antenna capacitance fed back.

Further exploration of 1921 *QST* issues revealed a Hartley circuit used by the University of Rhode Island Radio Club, 1XX, [3] using VT-2s or General Electric "E" tubes. Since I had little control of my antenna capacitance to ground, and no easy way to vary inductance in the small amounts necessary to tune today's bands, I opted to switch the circuit to the Hartley configuration but retaining the UV-202s. See Figure 1.

Based on my prior experience with other Hartley oscillators, I decided to go for "battleship" construction and good looks. I started with a 9" × 11" × 5/8" decorative pine base, stained and coated with numerous applications of spray lacquer. The UV-style tube sockets, tuning condenser, grid leak condenser/resistor combination, homemade terminal strips for supply voltages and antenna connections, and beehive style ceramic standoffs for the tank coil are mounted directly to the base with brass wood screws. A 2-ohm 3.5-amp filament rheostat, Weston model 267 DC milliammeter (with patent dates from 1894 to 1901), and a homewound ceramic form RF choke (1" diameter, 3" long, #28 closewound enamel wire) are mounted to right angle brackets, which are also fastened to the wood base with brass screws. All other hardware, including thumb nuts on the tube sockets and terminal strips is also brass.

All filament and interconnection wiring, except tank circuit plate connections are made with .031" round brass rod, which is very stiff, and lends itself to very neat, solid wiring with 90 degree bends wherever the wire needs to turn. Tank circuit plate interconnections, of which there are only three, are made with .125" brass rod.

The tank coil itself is made of 11 turns of 1/4" copper tubing, 3 inches diameter and 4.5 inches long, and sprayed with clear lacquer to preserve the copper lustre. It is supported at the ends by the two beehive insulators, and the center is supported by the cathode tap, which is made of 3/16" tubing and .125 brass rod. All tank connections are secured with heavy copper wire screw clamps or large terminal lugs. This heavy duty construction virtually eliminates any vibration modulation of the oscillator signal, and there is no sign of RF heating of the tank resulting in unacceptable oscillator drift.

The tank condenser is of 1926 vintage, made with heavy brass plates, which seem to impart a distinctive, pleasing, yet unobtrusive chime sound to the oscillator when run on DC voltages. I believe this is the result of the brass plates vibrating ever so slightly under the stress of heavy RF current. The "chime" sound is lost in succeeding evolutions.

This circuit worked immediately, the brightly glowing bottles (bright enough to easily read by)

AUTHOR'S ADDRESS: 28 MOLINARI DR., WANAQUE, NJ 07465

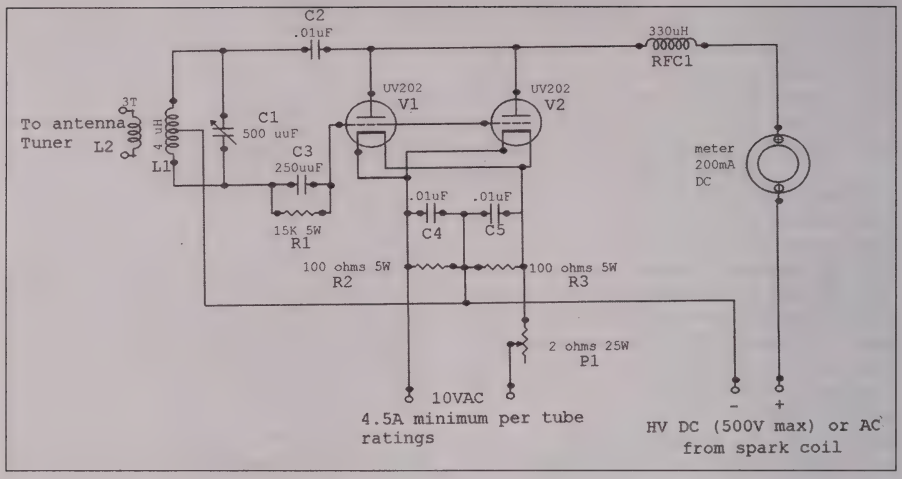


Figure 1. Schematic of Hartley Oscillator as built.

delivering over 15 watts with 500 volts DC on the plates. I used this rig for the first time on the air during the 2000 AWA Linc Cundall Memorial Contest with very good results, but felt something was lacking.

While rummaging for whatever old treasures were available at the Bergen Amateur Radio Association bi-annual flea market in June 2000, I stumbled across a curious wood box with three terminals and a buzzer contact on one end. It was marked "Ford." I knew I had found a model T spark coil! Sudden recollections of some early QST articles flashed in my head. Some articles by F.S. Huddy, III [4], [5] described first how induction coils, then in particular, the Ford spark coil, could be used to provide high voltage for tube oscillator circuits.

I bought the Ford coil untested for $5, took it to work, hooked 6 volts DC to the primary, and got in return a VERY ratty high voltage AC output from the secondary. Its true RMS value varied all over the place, and peak voltage was somewhere around 900V. Loading it down with a resistive load, the little wooden box delivered about 170VAC RMS into a 10K load after some fine tuning of the vibrator contact spacing and boosting the DC voltage to the primary to 8 volts.

Higher primary voltages did not raise the secondary output appreciably, yet raised the primary current proportionately to the voltage. I do not know the actual voltage used in a model T system. Figure 2 shows the actual waveform, along with the RMS voltage, peak-to-peak voltage, frequency and duty cycle of the secondary output. I used a 20 to 1 voltage divider to allow

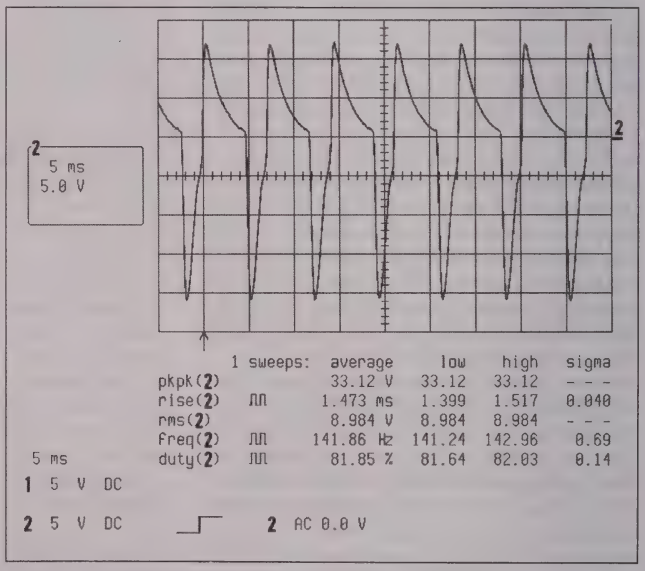


Figure 2. Oscilloscope waveform of the Ford spark coil secondary output.

the scope to accommodate the high voltages involved, thus the voltage readings should be multiplied by 20. Note also the non-symmetrical waveform.

A word about spark coils is in order here. Commonly known as induction coils in early radio parlance, spark coils take a low voltage DC and transform it into high voltage AC. The coil can have either an isolated primary and secondary, or the primary and secondary can be internally connected to a common "ground," similar to an autotransformer or a variac.

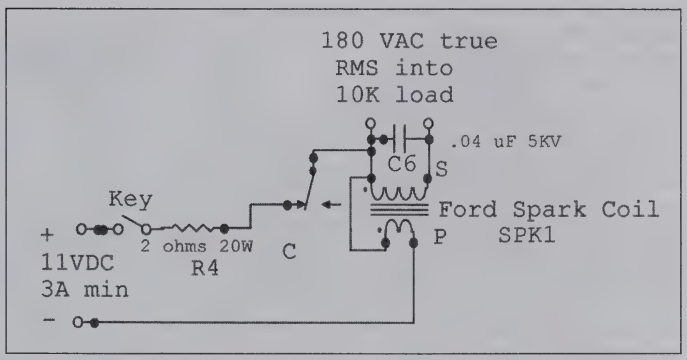


Figure 3. Schematic of Ford spark coil hooked up for powering the oscillator.

DC is applied to the primary winding, which normally has relatively few turns of heavy wire, and is in series with a vibrator contact in line with the coil core. As the coil is energized, the contact pulls in, breaking the primary connection, then the contact pulls out, completing the circuit once more. This process repeats itself from 30 to 200 times per second.

As the power to the primary is repeatedly broken and restored, the magnetic flux field rises and collapses, inducing voltage into the secondary winding. The secondary is usually a high voltage winding—many turns of fine wire wound over the primary. See Figure 3 for spark coil connections.

Spark, or induction, coils found use in commercial radiotelegraphy in the spark era. In *Practical Wireless Telegraphy* [6], the induction coil was used as the emergency transmitter high voltage generator, driving a small spark-gap closed oscillation circuit in a Marconi shipboard radio installation. Spark coils were limited to such emergency use because the power available from them was rather low for commercial purposes.

But early amateurs found the spark coil useful. It offered a convenient way to generate the high voltage necessary for either spark or vacuum tube radio transmission. Motor-generator sets were expensive, and many areas of the country had no reliable source of commercial power. A battery, and the spark coil, perhaps borrowed from the family auto, were all that an enterprising amateur needed. When converting to vacuum tube operation, the ham operator frequently used his old spark transmitter as a foundation, utilizing the original high voltage supply, keying, and oscillation circuits, but replacing the spark gap with a vacuum tube [2], [6]. It was, therefore, logical that an amateurs might keep the induction coil as one method of generating

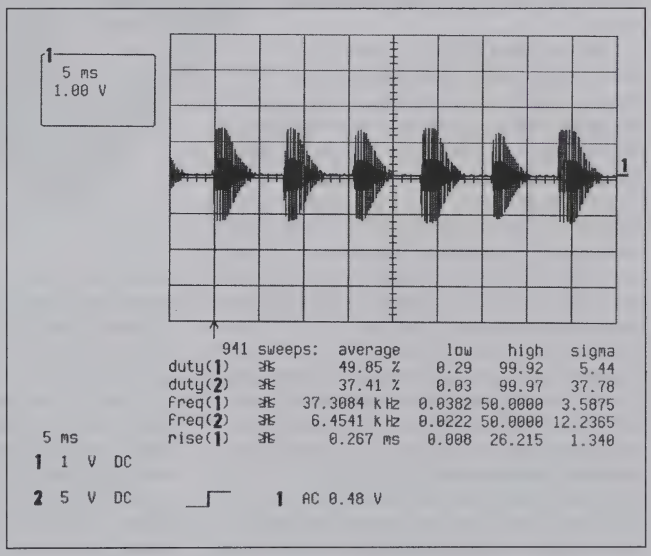


Figure 4. Oscilloscope waveform of the RAC transmitter output, steady key down.

the high voltage required for the vacuum tube circuit.

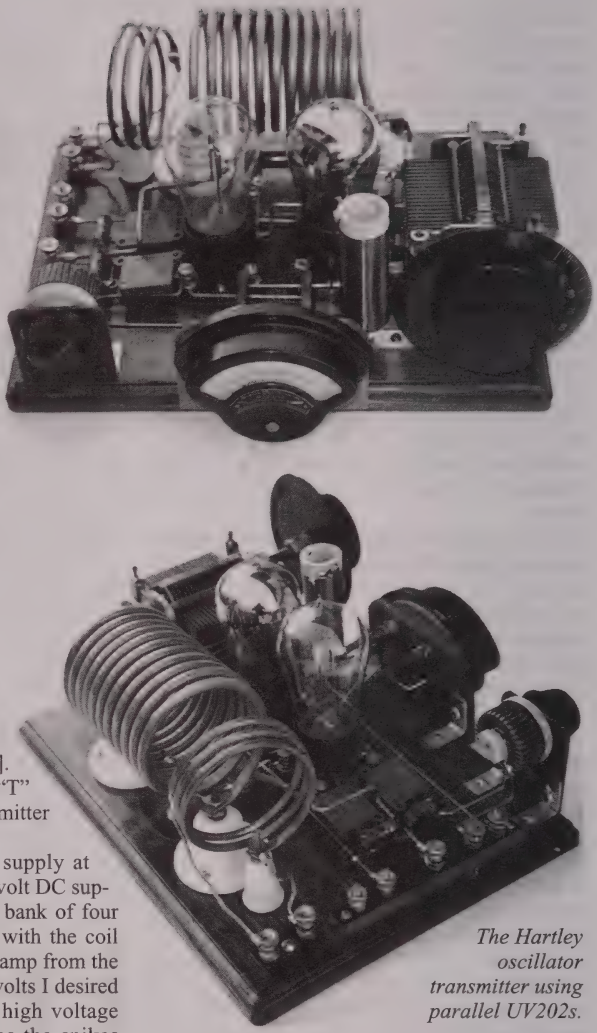
With such a setup, the transmitter tube functions not only as an oscillator at RF, but also as a rectifier—since it conducts the induction coil AC in one direction only. Transmitters using this method of providing high voltage to a vacuum tube oscillator are often called "raw AC" or AC-CW transmitters. They have a characteristically buzzy or raspy sound, and fit the A-2 (modulated CW) class of RF emission.

In this case the CW is being switched on and off at the vibrator frequency and there is some frequency shifting due to the rapidly rising and falling plate voltage. Such signals are inherently broad banded, with sidebands and spurs sometimes many KHz removed from the oscillator frequency.

At this point I searched in earnest for more Ford spark coil information in *QST*, and found more articles by Mr Huddy, one showing a complete oscillator powered by a Ford spark coil [7]. That clinched it, I would use the "T" coil for the next AWA 1929 Transmitter Party.

I do not have a 6 volt power supply at home so I adjusted a regulated 12 volt DC supply down to 11 volts, and used a bank of four half ohm 10W resistors in series with the coil primary. The coil draws about 1.5 amp from the supply with this setup, with the 8 volts I desired on the coil primary. A .04 mFd high voltage transmitting mica capacitor keeps the spikes down on the secondary. I keyed the DC input, using either a McElroy bug or a Speed-X hand key, both with large contacts. I could not detect any difference in primary current with or without the transmitter connected, and deduced that the series resistors in the primary did not seriously affect the regulation of the secondary output voltage. I mounted the Ford coil, resistors, and mica filter capacitor on a small wood board with a suitable terminal strip.

Running this into the parallel pair of UV-202s, the average plate current was about 10-15 mA according to the Weston 267 milliammeter. The spark coil output is connected between what would be the plate DC plus terminal and ground.



The Hartley oscillator transmitter using parallel UV202s.

Because the AC wave out of the spark coil is not symmetrical about zero, it was necessary to try reversing the secondary connections to the oscillator to determine which way produced maximum current self-rectification in the tube.

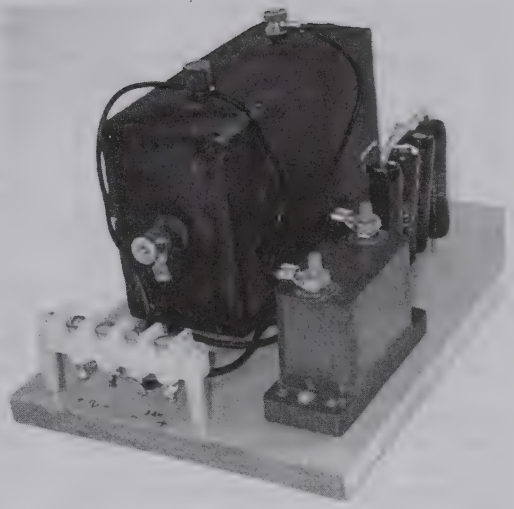
I could not accurately measure the AC voltage on the plates because of RF interference to my digital voltmeter, but the transmitter produced a monster half-watt output signal having a broad but pleasing buzz. I powered the UV202 filaments from a 10VAC filament winding. The rheostat was set about 2/3 turn below maximum resistance (about .7 ohms) to give the rated 7.5V on the filaments, resulting in approximately 3.5 amps of fil-

ament current. Almost thirty watts to light the filaments, plus another 16 or so to power the spark coil, for just 1/2 watt out makes for a very inefficient transmitter!

Figure 4 shows a sample of the RF output waveform from my RAC transmitter. The wave is a steady key-down signal, broken up into a series of pulses of RF as the oscillator is switched on and off by the AC plate voltage from the spark coil at about 140Hz. Each pulse contains several thousand cycles of RF at about 3.7 MHz. This waveform is quite similar to the damped wave generated by a spark transmitter. The oscilloscope data acquisition system could not accurately measure the various parameters of the RF due to the noise inherent in the signal.

I debuted my spark-coil powered transmitter in the AWA Bruce Kelley Memorial 1929 QSO Party for 2000 and worked a number of stations, with signal reports on the tone ranging from "T1" (raw AC) to T9 (perfect DC note), and repeated this in the 2001 Party. Interestingly, there were several other stations with "raw AC" signals, including one other using a Ford spark coil. Others use regular transformers to AC-power an oscillator.

Despite the fact that I blamed my wife for this, I must confess it is in the blood. My dad, WA2UEJ confided to me recently that when he was a teenager during the depression, he and a friend several houses away communicated using two Ford spark coils and a long loop of wire between their houses. He said they knocked out all the local broadcast reception, and later in life he realized they probably didn't have to use the loop at all.



Ford spark coil mounted with resistors, capacitor, and terminal strip.

Parts List For 1921 Transmitter (Figure 1)

C1	500 uuF (min capacity closed) variable condenser,receiving type spacing suitable
C2	.01 uF, 1000V mica
C3	250 uuF 1000V mica
C4, C5	.01 uf 1000V mica
L1	11 turns 1/4-inch copper tubing, 3 inch diameter, Length 4.5 inches, tapped at center
L2	3 turns 3/16 inch copper tubing, spaced about 1/2 inch fromL1, and pivoted on one standoff for coupling adjustment.
P1	2 ohm 25 watt rheostat
R1	15K ohm, 5 watt
R2, R3	100 ohm 5 watt
RFC1	#29 magnet wire closewound on a 1 inch ceramic form, 3 inches long, approximately 330uH inductance
M1	Weston 267 milliammeter, 200mA FS
V1, V2	UV202 tubes

Notes

1. Tank circuit values can vary somewhat, however total L1 inductance in uH times C1 capacitance in uuF should total a minimum of 2000 for 80 meter operation, with inductance no more than 5 uH for best stability.
2. Ceramic capacitors may be used for C2, C4, C5, and C6. Voltage ratings should be at least 1 kV for C2 and 2kV for C6. C4 and C5 voltage ratings not critical.
3. R1 wattage value may be reduced to 2 watts.
4. Rheostat P1 may be eliminated if a 7.5V filament supply is available.
5. Many different tube types will work in this circuit with suitable provision for filament voltage compensation. 210, 45, 2A3, 201, 171 among others are suitable.
6. A commercial RF choke may be substituted for RFC1.
7. A DC supply may also be used with the oscillator, with B+ going to the meter, ground to the cathode center tap. The key would then

be placed in the ground line.

8. Components used in my circuit were chosen for availability (from my junque box) and suitability. Much of the essence of early radio construction was making components on-hand work, and there is much room for variation and experimentation with other component values and types.

Parts List For RAC Power from a Ford Spark Coil (Figure 3)

C6 .04 uF, 5000V mica
R4 2 ohms, 20 watts, made up of 4 ea 0.5 ohm 5 watt resistors In parallel
SPK1 Ford Model T spark coil
Note: R4 wattage may be as low as 10 watts total.

References

1. "A Sure-Fire CW Circuit" by E.W. Whittier, 1DH, *QST* Magazine, July 1921, Page 27
2. George E. Sterling, *The Radio Manual* copyright 1928 by D. Van Nostrand Co, Inc., page 173 and 272
3. "Some Simple CW Sets," author not listed, *QST* Magazine, April 1921, page 16
4. "A Few Ideas For Amateur CW", author not listed, *QST* Magazine, September 1920, page 5
5. "Cheap ICW Potential," F.S. Huddy, III, *QST* Magazine, January 1921, page 25
6. Elmer E. Bucher, *Practical Wireless Telegraphy*, copyright 1918, Wireless Press, N.Y., page 180 and 223
7. "CW for the Amateur," F. S. Huddy, III, *QST* Magazine, May 1921, page 21

Silent Keys

We record the passing of the followingAWA members with deep regret.

*__LEO LAWRENCE GIBBS__, W8BHT (5-2-02)
__THOMAS ALAN JOHNSON__ (3-18-02)
__ROBERT V. MCGRAW__, W2LYH
__CHARLES NEVEL__, W3KSQ
__DANA A. ROWE__
*__RALPH O. WILLIAMS__, N3VT (5-31-02)

***Leo Lawrence Gibbs, W8BHT**
Leo was an electronic engineer involved in the research and development of vacuum tubes at Wright-Paterson Air Force Base from 1940 to 1972. He was responsible for the development of more than 20 sub-miniature tubes, which allowed radio equipment to operate in high impact and vibration prone environments. During WWII, he aided the war effort by expediting the mass production of tubes for radar applications.

***Ralph O. Williams**
Please see "Remembering Ralph Williams" elsewhere in this issue.

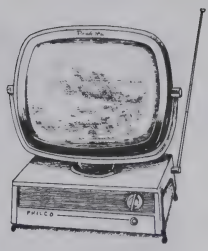
In the "Silent Keys" column for May, 2002, information about Christopher Wincey was accidentally printed under the name of Jack Kingman. The OTB *extends its apologies to the Wincey and Kingman families. The Wincey information is reprinted below as it should have appeared.*

Christopher R. Wincey, N1BKR, 72, (2-5-02)
A true old-time radio operator, he worked on merchant ships for years and, later, on the SS United States. His land assignments included WCC in Chatham, MA, WSC in Tuckerton, NJ and RCA's WNY in New York Harbor. (Thanks to Bill Plimpton, W2IXH)

Note: AWA officers and members are requested to submit all information about Silent Keys, with or without special recognition, to Joyce Peckham, Secretary, Box E, Breesport, NY 14816. This will help in the collection, coordination and appropriate recognition of both AWA members and others who have made contributions to the electronics and entertainment industries.

TELEVISION

EDITED BY **RICHARD BREWSTER**, 145 LITTLE PECONIC BAY ROAD,
CUTCHOGUE, NY 11935 *PLEASE INCLUDE SASE FOR REPLY.*



The SEE-ALL Television Receiver

The January-February 1932 issue of *Television News* describes the SEE-ALL television receiver as: "...one of the most popular television receivers now on the market." The Television Manufacturing Co. of America, Inc. manufactured these receivers at its factory located at 473 Liberty Ave., Brooklyn, NY. The sales office was located in Manhattan at 5 Union Square.

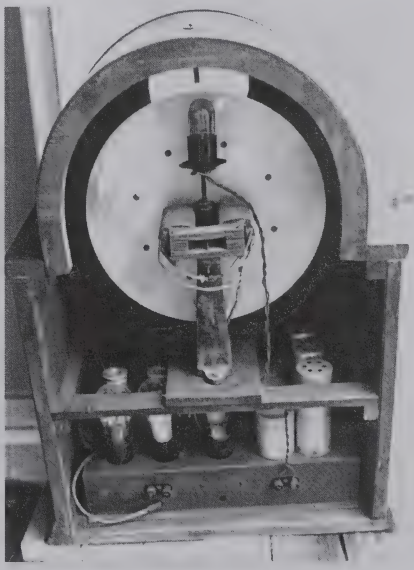
The Model 101 was priced at $69.50 (less tubes) according to the brochure. But the set was discounted to $42.21 (with tubes!) in the *Radio Trading Co. catalog no.25*, Spring and Summer 1932.

The set looks like a large cathedral radio, and includes both a scanning unit and a 6-tube receiver. It measures 27" by 9" by 10" deep. The TRF receiver utilizes two 35 tubes as RF amplifiers and a 24 as a plate detector. A 24 "video" amplifier is resistance-coupled to the 45-output triode. The 45 feeds the neon tube—which is in series with its plate circuit. The typical 80 rectifier provides power for the circuits. The tuning range is 80 to 200 meters, which at that time was considered to be the television band (just above the broadcast band at 200 to 500 meters).

The twelve-inch diameter television disc has a spiral of 60 square holes, each hole .0085 inches on a side, and is driven by a self-starting (according to the company brochure) eddy-current motor running at 1200 rpm. (Interestingly, the operating instructions suggest, "It may be necessary to give the shaft a slight start.") The rotating disc produces a 60-line image 20 times per second. A six-inch lens mounted behind the front panel of the cabinet magnifies the one-inch square image. The Radio Trading Co. ad explains that "As many as four people can enjoy a television program at the same time."

This receiver was designed to operate on the

(continued on page 36)



Cabinet of the Model 101 looked like a large cathedral receiver, contained a 6-tube video receiver and a scanning disc.

EDITED BY **LUDWELL A. SIBLEY**, 102 MCDONOUGH RD., GOLD HILL, OR 97525-9626

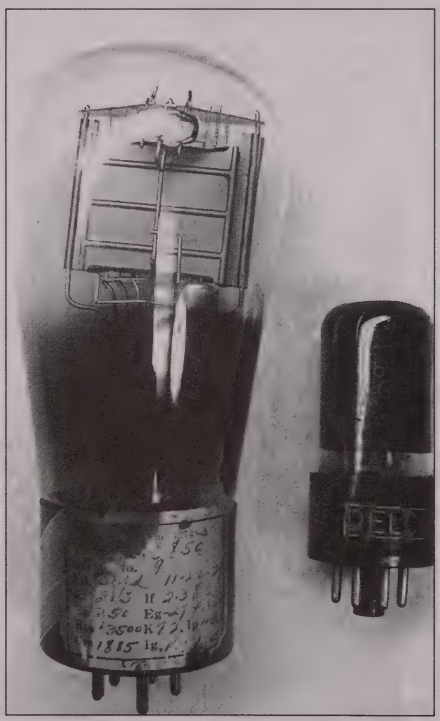
The RSC-850: Another "Mystery" Tube

The first pentode output tube on the U.S. market was the PZ, introduced by Arcturus in early 1931. It was followed soon after by RCA's 47, which was essentially the same product.

However, there was another pentode a year-plus earlier, one that could have been introduced early enough to upstage the PZ and also make the now-venerable 45 triode redundant. Developed by General Electric, it was coded RSC-850.

I ran into the Standardizing Notices on this type in the Dowd-RCA archive a couple of years ago.* The SNs are dated September 1929. They give a full technical description and how-to-build-it details on a five-pin, filament-type power pentode in a S21 bulb ("spherical" shape, 2 1/8" in diameter). The instructions for branding the tube specify the RCA logo, meaning that RCA was to promote it to the consumer market—it was not to be a GE offering limited to industrial use.

This tube would have been ready for production about the time that GE transferred the Harrison tube plant to the new RCA Radiotron Company. RCA gave it its own developmental



The RSC-850 developmental sample with a 6V6 GT provided for size reference. Louis De Gonzague Photo.

RSC-850 version from Al Jones collection has same internal structure, but suppressor grid is connected to top cap. Sibley Photo.

number, A-410.

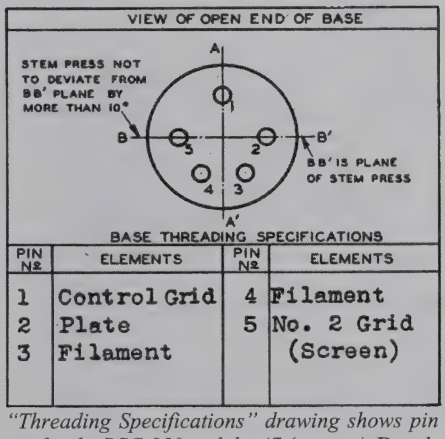
The Standardizing Notices in the archive had been marked-up with changes. The control and screen grids were made narrower. The grids were originally not to have any special treatment after winding, but were changed to "fired in hydrogen." The suppressor grid, originally a mesh woven from nickel wire, became a simple wound design using molybdenum like the others. Other small parts like the getter were changed, and the bulb went from an S21 style to an ST19.Then the package was "recalled" (abandoned) in August 1931.

It wasn't clear why this type hadn't "gone commercial." It may have simply gotten lost in the company reorganization. More likely, it may have been seen as too powerful for the need; it could put out four watts of audio power, more than twice what the then-popular 45 triode could produce at the same plate voltage.

RCA didn't give up on power pentodes. They designed the scaled-down A441, whose commercial version was the (2)47. The initial SNs on the production 47 are dated April 1931,while those on the A441 prototype are dated July 1932—surely a case of the A441's developers catching-up on their paperwork after the fact.

This tube became a lot more interesting recently, when Louis De Gonzague e-mailed photographs of an unidentified tube in his possession. It has a label on the base with date "11-22-29," electrical test results, and, in a torn area, the fragmentary identification "...C-850." This has got to be a developmental sample of the tube!

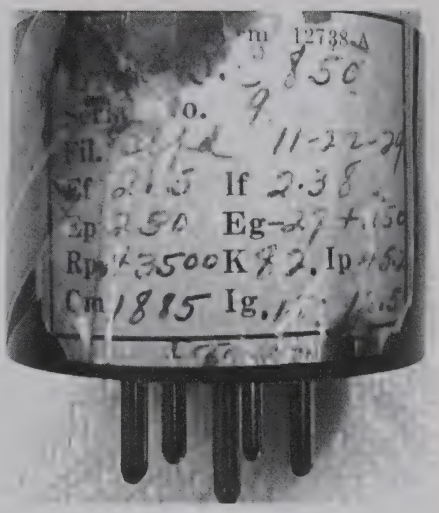
Beyond the De Gonzague version, tube collector Al Jones has another version of the RSC-850, internally the same but with a grid cap



BASE THREADING SPECIFICATIONS

PIN №	ELEMENTS	PIN №	ELEMENTS
1	Control Grid	4	Filament
2	Plate	5	No. 2 Grid (Screen)
3	Filament		

"Threading Specifications" drawing shows pin out for the RSC-850 and the 47 (see text). Dowd-RCA Archive.



Electrical test data noted on the RSC-850's base label. Louis De Gonzague Photo.

added—and the "grid" connected to it is the *suppressor*!

The 47 is familiar to us as being in an S17 or, later, an ST16 bulb. However, one page in the SNs gives the changes that were once planned, but not carried out, to put out the tube in an ST14 bulb.

The following is a comparison of the electrical parameters for the RSC-850 and 47.

	RSC-850	**47**
Filament	2.5V @ 2.5A	2.5V @ 1.75A
Max. Plate and Screen Voltage	250	250
Typical Operation		
Plate & Screen Volts	250	250
Bias Volts	-20	-16.5
Mu	150	ca. 90
Plate Resistance, ohms	50K	35K
Transconductance, mS	3.0	2.5
Plate Current, mA	45	32
Screen Current, mA	15	7.5
Load Resistance, ohms	4.0K	7.0K
Max. Power Out, watts	4.0	2.5

A "Threading Specifications" drawing covers the pin out for the RSC-850 and the 47. Note that the filament pins are "3"and "4," not the "1" and "5" with which we are familiar.This was the old GE-RCA designation system, in which the filament/heater pins were always numbered "3" and "4," no matter whether the base had four, five, six, or seven pins.

The designation "RSC-850" is something of a

mystery. The SNs show that there was also an "RSC-951," a variant of the regular (2)27 with coiled, not straight, heater.

**The Dowd-RCA archive has proven useful in cracking several "whatzits" like this. A resource of the AWA Museum, it is housed for the present in southern Oregon. It began as simply the SNs from the RCA Harrison plant, but has been expanded with a group of files from RCA's military marketing department and the personal papers of RCA tube developer A. Danforth Cope.*

The same site presently holds the Perham-Eimac archive, owned by the Perham Foundation. Both collections are now shelved in logical order, labeled, and generally available for research use. Anyone wishing more information or to visit these treasures is welcome to contact the writer via tubelore@internetcds.com or on (541) 855-5207.The site is only seven miles off I-5, about 40 miles north of the California border.

TELEVISION, *continued from page 33*

same power system as the transmitter; that is, its synchronism was dependent on the receiver disc motor being driven by exactly the same AC frequency as that driving the transmitter disc motor. In those days (the 1930s) many power systems existed which were not tied into a national grid, and, in fact, some were DC.

Synchronous motors not operating on the same power system would not run at the same speed. The result would be a picture that continually moved across the viewing area, its rate of shifting dependent on how much the nominally 60-cycle frequency of the receiver power system differed from that of the transmitter. A company brochure explains that if both transmitter and receiver are on the same power system, the receiving disc "will usually adjust itself and come into perfect step with the transmitter of its own accord."

"Be the first in your neighborhood to have TELEVISION IN YOUR HOME" is the suggestion made in the company brochure! The January-February 1932 issue of *Television News* published the following list of television stations that were broadcasting 60 line pictures at 20 per second.

Jenkins / W3XK / 5kW / Silver Spring, MD

Jenkins / W2XCR / 5kW / NY City, NY

Baird / WIXAV / 1kW / Boston, MA

Freed Eisemann / W2XCP / 2kW / Allwood, NJ

De Forest / W2XCD / 5kW / Passaic, NJ

Radio Pictures / W2XR / 500W / LI City, NY

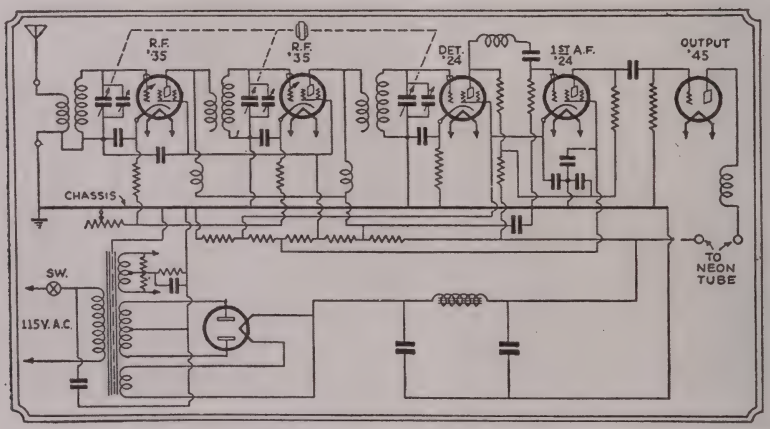
Atlantic Broadcasting Co. / W2XAB / 500W / NY, NY

National Broadcasting Co. / W2XBS / 5kW / NY, NY

Westinghouse Electric Co. / W8XAV/20kW / E. Pittsburgh, PA (Operated by Frank Conrad of KDKA fame!)

The Radio Trading Co. ad explained that "this receiver, located in the heart of New York City daily reproduced image transmissions from Passaic, Boston, Camden, Washington DC and other points." I have not had the opportunity to verify those results.

Note: I would welcome any ideas for future Television *columns.*



Schematic of the Model 101. Neon lamp positioned behind scanning disc was driven by type 45 output tube.

AWA ANNUAL CONFERENCE

RIT CONFERENCE CENTER (FORMERLY THRUWAY MARRIOTT), ROCHESTER, NY
AUGUST 28-31, 2002 • THEME: 50 YEARS OF AWA—1952-2002

WELCOME BACK! At the 41st Annual Conference, collectors and history enthusiasts will convene, exchange equipment, and learn more about the development of radio and electronics. If you have never been to the yearly "reunion," why not give it a try? Rochester (Henrietta) is just north of upstate New York's beautiful Finger Lakes region, easily reached by car or plane. The site is 26 easy miles from the AWA Museum at Bloomfield.

Advance registration is encouraged to facilitate preassembly of registration materials and preassignment of flea market spaces. This will allow you to receive your conference packet upon arrival at the registration desk with a minimum of delay. Preregistration, using the enclosed card, can be made through AWA Registration, c/o Bobbi Hagenbuch, 1045 Bonair Dr., Williamsport, PA 17701, e-mail awa_register@suscom.net, before August 22. There will be unlimited registration at the door.

The conference site is the Rochester Institute of Technology Conference Center. Formerly the Thruway Marriott hotel, this is the same facility where we've been running the conference for many years. It offers special nightly rates ($89.00 for a single, double or triple) on a bloc of rooms that will be reserved for the conference until August 9th. It's first-come-first-served, so get your reservation in early. For info or reservations, call (585) 359-1800. The Conference Center has restaurant facilities, and other lodging and eating places are nearby.

The hotel is reached from Exit 46 of the New York State Thruway (I-90): take I-390 north to NY 253 west, to NY 15 south. For visitors arriving by air, the location is about seven miles or 15 minutes from the airport. There is shuttle service, 6 a.m.-11 p.m. (specify the RIT Conference Center). If you take a cab, make sure the driver understands that you are NOT going to the RIT campus, but rather to the RIT Conference Center, which was formerly the Thruway Marriott Hotel.

Conference Chairperson
HUGH DAVEY

Assistant Conference Chairperson
BRUCE ROLOSON

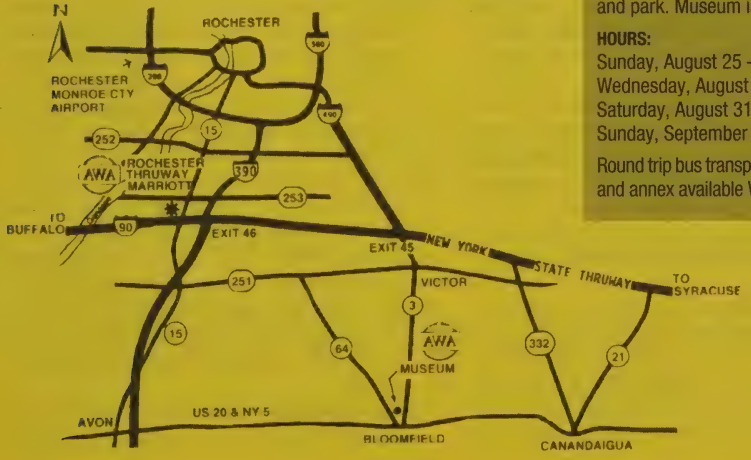
Program Chairperson
LAUREN PECKHAM

Contest Chairperson
GEOFFREY BOURNE

Financial Chairperson
BARNEY WOOTERS

Trip Chairperson
ROBERT SCHAUMLEFFEL

Shuttle and Pre-registration Chairperson
BOBBI HAGENBUCH



AWA ELECTRONIC COMMUNICATIONS MUSEUM
VILLAGE GREEN, BLOOMFIELD, NY

Refer to map at left. Directions from hotel: Right (south) on Rt. 15. At Avon (9.5 mi.), left (east) on Rts. 5 & 20. At Bloomfield (16 mi.), left at brown "Radio Museum" sign near Holloway House restaurant. Go approx. 200 ft. and park. Museum is on the left.

HOURS:
Sunday, August 25 — 2-5 p.m.
Wednesday, August 28 — 7-9 p.m.
Saturday, August 31— 2-4 p.m.
Sunday, September 1 — 2-5 p.m.

Round trip bus transportation to museum and annex available Wed. evening.

AWA Conference Agenda

TUESDAY (8-27-02)

5 p.m.-7 p.m.—Registration will open in the flea market tent.

5 p.m.-7 p.m.—Parking in flea market for registered vendors.

7 p.m.—PBS Video: *Decoding Nazi Secrets*, Tom Perera; Seneca-Onondaga Rooms.

WEDNESDAY (8-28-02)

5:30 a.m.—Shuttle Bus Service from area hotels begins.

6:00 a.m.—Flea market opens (through 11 a.m. Saturday). Flea market registration begins. Food service will be available on-site. (Wed. to Fri.)

6:31 a.m.—Sunrise

8 a.m.-5 p.m.—Registration for Conference. Assembly Corridor.

8 a.m.-5 p.m.—Book Fair, Pre-assembly Court.

9 a.m.—AWA Members' Forum. Be ready with questions, discussion topics, suggestions regarding the operation/mission of our Club. Conducted by AWA President Bill Fizette. Seneca-Onondaga Rooms.

10:30 a.m.—*Zenith Transistor Radios: Evolution of a Classic*, Norm Smith. Seneca-Onondaga Rooms.

2 p.m.—*Amateur Radio in Disaster Relief*, Bart Lee. Seneca-Onondaga Rooms.

2-4 p.m.—Ladies' Tea. Hotel Gazebo, social event for ladies only. All welcome free of charge.

4 p.m.—*Key & Telegraph Seminar*, moderated by Tom Perera. Seneca-Onondaga Rooms.

6:30 p.m.—Bus to Museum.

7-9 p.m.—AWA Museum and Annex open. Bus leaves hotel at 6:30 p.m. (meet in front lobby) and returns approximately 9:30. Round trip bus fare, $12.00.

7:30 p.m.—*Moonlight Restoration Forum*, host Marc Ellis. Seneca-Onondaga Rooms. Brief formal presentations on restoration issues, followed by informal group discussion. Bring your questions and restoration case histories.

THURSDAY (8-29-02)

8 a.m.-5 p.m.—Registration. Assembly Corridor.

8 a.m.-5 p.m.—Book Fair. Pre-assembly Court.

9 a.m.—*History and Restoration of Cone Speakers*, Buford Chidester. Seneca-Onondaga Rooms

10:30 a.m.—*The Enigma Cypher Machine: History, Operation and Description*, Tom Perera. Seneca-Onondaga Rooms.

Noon—Ladies Luncheon. Salon A. There will be a program on the Genessee Country Museum.

1:00 p.m.—*History and Products of the Stromberg Carlson Co.*, Lud Sibley. Seneca-Onondaga Rooms.

3-4:30 p.m.—Main Auction check-in, bidder registration.

4:30-6 p.m.—Auction Preview. Registration and bidding card are good for all auctions. Registration fee of $3 non-refundable. **No items containing mercury!!** Seneca-Onondaga Rooms.

7-10 p.m.—Old Equipment Contest—check-in of entries. Henrietta Ballroom (Salons A, B, C). This is the time to bring in displays.

7:30-8 p.m.—Auction preview continues.

8 p.m.—Vacuum Tube Auction. Bruce Roloson, auctioneer. Successful bidders must pick up tubes after the auction. Seneca-Onondaga Rooms.

FRIDAY (8-30-02)

8 a.m.-5 p.m.—Registration. Assembly Corridor.

8 a.m.-5 p.m.—Book Fair. Pre-assembly Court.

8 a.m.—Auction Preview continues. Seneca-Onondaga Rooms.

8-11 a.m.—Equipment Contest Judging. Salons A, B, C.

8 a.m.—Annual Sightseeing Excursion tour bus leaves for Woman's Rights National Park 8:00 a.m. sharp from RIT Conference Center lobby entrance, returns about 4:30 p.m. Cost: $48.50 including lunch.

9 a.m.—Paper Collectibles Auction, Walt Buffinton, auctioneer. Iroquois Ballroom.

10:00 a.m. to noon—General Auction, continuing from paper-collectibles, includes gear donated to support Museum maintenance. Auctioneer, Walt Buffinton

11 a.m.-noon—Equipment Contest entries open for viewing. Salon A, B, C.

1-4:30 p.m.—General Auction continues.

1-5 p.m.—Equipment Contest viewing continues. Salon A, B, C.

3:30 p.m.— *Review Of Amateur Operation*, John Rollins, W1FPZ. A fun time for all hams and a chance to discuss various activities. Salon D.

7 p.m.—AWA Top Awards Banquet. *50 Years of the AWA* slide presentation by Dick Ransley. Cash bar available. Various AWA awards will be presented.

9-11 p.m.—Equipment Contest viewing continues. Salon A, B, C.

FIFTY YEARS OF AWA — 1952-2002

*By Geoffrey Bourne and Ralph Williams, N3VT**
**Silent Key May 31, 2002*

The AWA Old Equipment Categories for the 2002 contest are divided into two major groups: Theme and Standard. The Theme categories reflect the Conference's central historical purpose: a review of the 50-year history of the Antique Wireless Association. This year, to celebrate this milestone in the history of the AWA, we will be doing something quite different from the previous contests. The theme categories will be essentially the same as the standard categories but with one difference. To enter in the theme category the item must have won a blue ribbon at a previous AWA contest.

Here's another chance to display your prized artifact. Don't wait another fifty years to show your favorite radio!

THE THEME CATEGORIES

1. **PASSIVE RECEIVERS**
   Any detecting device, not including vacuum tubes or solid state amplifying devices whose purpose is to convert radio energy into intelligent signals.

2. **1920s SUPERHET RECEIVERS.**
   Any receiver which employs the superheterodyne circuit and is from the 1920s can be entered here.

3. **1920s TUNED RF RECEIVERS**
   During the 1920s, the TRF set was one of the most widely marketed. It was sold in kit form, factory assembled or built from scratch form plan in a magazine. This is where you would enter a Freshman Masterpiece or an AK 20 and so on.

4. **1920s REGENERATIVE AND REFLEXED RECEIVERS**
   Many manufacturers employed different circuits to improve the receiving capabilities of their radios. The regen and reflex are among the many circuits that were used. Bring in a fine example of this type of radio.

5. **CATHEDRALS AND TOMBSTONES**
   These are probably the most recognized antique radio styles. Just about everyone remembers someone in their family who owned one. So bring in that Philco 90 or Zenette or any other cathedral or tombstone style radio.

6. **AWA HISTORY AND ARTIFACTS.**
   This would be the category to enter a retrospective of your remembrances of the AWA. Old photos of past meets or anything relating to the history of the AWA. Be creative.

7. **SPEAKERS**
   A. HORN: Any sound reproduction device can be entered here as long as it employs a horn or bell for sound amplification.
   B. CONE: When radio sets obtained greater power output levels the magnetic speaker unit was designed with large surface areas for better sound reproduction. There are many fine examples of this type of speaker. i.e. Tower Adventurer, Western Electric…

8. **TUBES**
   In this category you can display a single tube or a collection. There should be a common theme with the display, such as historical significance, technological break through, etc. The display should tell a story.

9. **SPARK TRANSMITTERS AND ARTIFACTS**
   Do not hesitate to enter a major piece of spark equipment if you think it is rare or historically significant.

10. **VACUUM TUBE TRANSMITTERS AND RECEIVERS**
    Some of the sets for this class are old, some not so old, most home-built. While the predominant entries have been amateur-operated, commercial equipment is welcome.

THE STANDARD CATEGORIES

11. **PASSIVE RECEIVERS**
    See Theme Category 1

AWA Conference Agenda

TUESDAY (8-27-02)

5 p.m.-7 p.m.—Registration will open in the flea market tent.

5 p.m.-7 p.m.—Parking in flea market for registered vendors.

7 p.m.—PBS Video: *Decoding Nazi Secrets*, Tom Perera; Seneca-Onondaga Rooms.

WEDNESDAY (8-28-02)

5:30 a.m.—Shuttle Bus Service from area hotels begins.

6:00 a.m.—Flea market opens (through 11 a.m. Saturday). Flea market registration begins. Food service will be available on-site. (Wed. to Fri.)

6:31 a.m.—Sunrise

8 a.m.-5 p.m.—Registration for Conference. Assembly Corridor.

8 a.m.-5 p.m.—Book Fair, Pre-assembly Court.

9 a.m.—AWA Members' Forum. Be ready with questions, discussion topics, suggestions regarding the operation/mission of our Club. Conducted by AWA President Bill Fizette. Seneca-Onondaga Rooms.

10:30 a.m.—*Zenith Transistor Radios: Evolution of a Classic*, Norm Smith. Seneca-Onondaga Rooms.

2 p.m.—*Amateur Radio in Disaster Relief*, Bart Lee. Seneca-Onondaga Rooms.

2-4 p.m.—Ladies' Tea. Hotel Gazebo, social event for ladies only. All welcome free of charge.

4 p.m.—*Key & Telegraph Seminar*, moderated by Tom Perera. Seneca-Onondaga Rooms.

6:30 p.m.—Bus to Museum.

7-9 p.m.—AWA Museum and Annex open. Bus leaves hotel at 6:30 p.m. (meet in front lobby) and returns approximately 9:30. Round trip bus fare, $12.00.

7:30 p.m.—*Moonlight Restoration Forum*, host Marc Ellis. Seneca-Onondaga Rooms. Brief formal presentations on restoration issues, followed by informal group discussion. Bring your questions and restoration case histories.

THURSDAY (8-29-02)

8 a.m.-5 p.m.—Registration. Assembly Corridor.

8 a.m.-5 p.m.—Book Fair. Pre-assembly Court.

9 a.m.—*History and Restoration of Cone Speakers*, Buford Chidester. Seneca-Onondaga Rooms

10:30 a.m.—*The Enigma Cypher Machine: History, Operation and Description*, Tom Perera. Seneca-Onondaga Rooms.

Noon—Ladies Luncheon. Salon A. There will be a program on the Genessee Country Museum.

1:00 p.m.—*History and Products of the Stromberg Carlson Co.*, Lud Sibley. Seneca-Onondaga Rooms.

3-4:30 p.m.—Main Auction check-in, bidder registration.

4:30-6 p.m.—Auction Preview. Registration and bidding card are good for all auctions. Registration fee of $3 non-refundable. **No items containing mercury!!** Seneca-Onondaga Rooms.

7-10 p.m.—Old Equipment Contest—check-in of entries. Henrietta Ballroom (Salons A, B, C). This is the time to bring in displays.

7:30-8 p.m.—Auction preview continues.

8 p.m.—Vacuum Tube Auction. Bruce Roloson, auctioneer. Successful bidders must pick up tubes after the auction. Seneca-Onondaga Rooms.

FRIDAY (8-30-02)

8 a.m.-5 p.m.—Registration. Assembly Corridor.

8 a.m.-5 p.m.—Book Fair. Pre-assembly Court.

8 a.m.—Auction Preview continues. Seneca-Onondaga Rooms.

8-11 a.m.—Equipment Contest Judging. Salons A, B, C.

8 a.m.—Annual Sightseeing Excursion tour bus leaves for Woman's Rights National Park 8:00 a.m. sharp from RIT Conference Center lobby entrance, returns about 4:30 p.m. Cost: $48.50 including lunch.

9 a.m.—Paper Collectibles Auction, Walt Buffinton, auctioneer. Iroquois Ballroom.

10:00 a.m. to noon—General Auction, continuing from paper-collectibles, includes gear donated to support Museum maintenance. Auctioneer, Walt Buffinton

11 a.m.-noon—Equipment Contest entries open for viewing. Salon A, B, C.

1-4:30 p.m.—General Auction continues.

1-5 p.m.—Equipment Contest viewing continues. Salon A, B, C.

3:30 p.m.— *Review Of Amateur Operation*, John Rollins, W1FPZ. A fun time for all hams and a chance to discuss various activities. Salon D.

7 p.m.—AWA Top Awards Banquet. *50 Years of the AWA* slide presentation by Dick Ransley. Cash bar available. Various AWA awards will be presented.

9-11 p.m.—Equipment Contest viewing continues. Salon A, B, C.

9-10 p.m.—Auction payment. Registration area.
11 p.m.-midnight—Equipment Contest pickup.

SATURDAY (8-31-02)

8 a.m.—Book Fair. Pre-assembly Court.
8 a.m.—Equipment Contest pickup.
9 a.m.—*The Life of Hugo Gernsback*, Tom Peterson. Seneca-Onondaga Rooms.
10:30 a.m.—*Pre-1912 Wireless and Electrical Apparatus*, discussion and display of items shown by members, moderated by Lauren Peckham. Seneca-Onondaga Rooms.
Noon—Finale luncheon—Luncheon with contest awards and closing of the 41st Conference. Salon A & B.
Noon—Shuttle Bus service concludes.
2-4 p.m.—AWA Museum open.

SUNDAY (9-1-02)

2-5 pm—AWA Museum open.

Flea Market Policies

Following are the policies that will be in effect for the year 2002 flea market.

First, the market will run only in conjunction with the conference dates, from Wednesday morning to Saturday afternoon. *No* flea-market sales will take place at the hotel parking lot prior to Wednesday. The flea-market area will be sealed off, unavailable to anyone, until the gate opens at 6 a.m. Wednesday. The prohibition of non-conference flea marketing is a matter of hotel rules and our Special Use Permit required by the Town of Henrietta. NO ITEMS CONTAINING MERCURY!!

Second, there will be only one class of site. All sites are treated the same and are issued randomly on a first-come, first-sold basis. Each member may pre-register for one or two sites, at $20 for the first and $35 for the second. Two sites to one member will always be adjoining. Pre-registration is highly recommended to assure a pre-assigned, numbered spot on the paved area. Everyone wanting to participate will get a spot. However, the paved-area, pre-numbered spots will probably sell out during the preregistration period. At that point we will start assigning spots on the grass on the Thruway side of the parking lot.

Third, flea-market headquarters will be located at the entrance to the market. Look for the big banner. This will be a full-service area where one can pay membership dues and registration fees, and sign up as a flea-market seller. Only AWA members may participate. **Everyone needs to register for the conference—the flea market is only a portion of overall conference activities. A non member wishing to sell in the flea market is welcome to join, paying $15 dues, $20 conference registration ($24 at the door), $20 for the first site and $35 for the second site. (Site assignments dependent on availability.)**

RULES AND CONDITIONS

EVENTS: Admittance to any activity, flea market included, requires a registration badge.

FLEA MARKET: Opens 6 a.m. on Wednesday. **NO ITEMS CONTAINING MERCURY.** New York State sales tax forms will be available. AWA not responsible for sales or tax. Neither AWA nor the Marriott is responsible for the security of personal property in the flea-market area. We are asked to confine market activity to the designated area to avoid the NY State Thruway right-of-way. KOA and other camp grounds are available in the vicinity. No overnight sleeping in the flea-market area.

Annual Sight-Seeing Tour

Assemble in the RIT Conference Center lobby on Friday, August 30 to board the deluxe motorcoach, which will leave at 8:00 sharp. We'll travel to Seneca Falls, NY, for a visit to the Women's Rights National Park. In 1848 Seneca Falls was the birthplace of the woman's rights movement, which was one of the most powerful and far-reaching influences for social change in American History.

During the tour, we will visit and explore the Women's Rights Hall of Fame; the Wesleyan Chapel, where the first women's rights convention was held; and the Elizabeth Cady Stanton home. Stanton was the founder of the movement, later joined by Susan B. Anthony and others.

Lunch will be at "Abigail's," and is included in the $48.50 tour price. The bus will return to the RIT Conference Center about 4:30 p.m. Questions: Contact Bob Schaumleffel, (716) 372-0360, or rwsradios@ adelphia.net

2002 Annual Conference — Easy Reference

For Tuesday evening, Aug. 27 and Sunday, Sept. 1 activities, see AWA Conference agenda.

	WEDNESDAY AUGUST 28	THURSDAY AUGUST 29	FRIDAY AUGUST 30	SATURDAY AUGUST 31
5:30 a.m.	Shuttle bus starts			
6 a.m.	Flea market opens			
8 a.m.	Registration; Book Fair	Registration; Book Fair;	Registration; Book Fair; Auction Preview; Contest Judging; Sightseeing Excursion	Book Fair Equipment Contest pickup
9 a.m.	Members' Forum	History and Restoration of the Cone Speaker	Paper Collectibles Auction	The Life of Hugo Gernsback
10 a.m.			General Auction	
10:30 a.m.	Zenith Transistor Radios	Enigma Cypher Machine		Pre-1912 Apparatus
11 a.m			Equipment Contest viewing until noon	
Noon		Ladies' Luncheon	Auction stops	Finale Luncheon Shuttle Bus stops
1 p.m.		History Of Stromberg-Carlson	General Auction and Contest viewing continue	
2 p.m.	Amateur Radio in Disaster Relief Ladies' Tea			Museum open 2-4 p.m.
3 p.m.		Main Auction Check in Until 4:30 p.m.		
3:30 p.m			Amateur Radio Topics	
4:00 p.m.	Key and Telegraph			
4:30 p.m.		Main Auction Preview (until 6 p.m.)		
6:30 p.m.	Bus to Museum			
7 p.m.	AWA Museum open	Check-in for Old Equipment Contest	Annual Awards Banquet (thru 10 p.m.)	
7:30 p.m.	Moonlight Restorations	Auction Preview continues (until 8 p.m.)		
8 p.m.		Vacuum Tube Auction		
9 p.m.			Equipment Contest; Auction payment	
11 p.m.			Equipment Contest pickup	

SHUTTLE BUS STOPS
(not necessarily in this order)

Red Roof Inn
Super 8 Motel
Fairfield Inn
Microtel
Country Inn & Suites
Day's Inn
Gateway Parking Center (behind Denny's)
RIT Conference center

12. 1920s SUPERHET RECEIVERS
See Theme Category 2

13. 1920s TUNED RF RECEIVERS
See Theme Category 3

14. 1920s REGENERATIVE AND REFLEXED RECEIVERS
See Theme Category 4

15. CATHEDRALS AND TOMBSTONES
See Theme Category 5

16. RADIOS IN DISGUISE
Entries here can range from an end table radio to a lamp radio. There are many different styles and variations. Some fine examples would be an Porto bar radio, Melody Cruiser, ship radio, or any radio made to look like something else.

17. SPEAKERS
See Theme Category 7

18. TEST EQUIPMENT
There were many makers of test gear. A short list would include Supreme, Superior, Hickok, Weston, Read-Rite, General Radio, Simpson, Rider, RCA, And too many others to list. So surprise us, bring in the unusual or the common.

19. TUBES
See Theme Category 8

20. SPARK TRANSMITTERS AND ARTIFACTS
See Theme Category 9

21. VACUUM TUBE TRANSMITTERS AND RECEIVERS
See Theme Category 10

THE CRAFTSMAN CATEGORIES

22. RESTORATION OF APPEARANCE
The purpose of this category is to display examples of rebuilding and refinishing the cabinets and containers that were used to house radio receivers. There is no requirement for a particular kind or size of set to be entered. A description of the work done will be considered an important part of the entry. The critical element is the appearance of the radio, including woodwork, escutcheons, dials, knobs and other visual details.

23. RESTORATION OF OPERATION
This is the category for those craftsmen who artfully substitute modern components for old failures. The new electrolytic in the old can is an excellent example. Another is the transistorized tube. Perhaps the replacement of pot-metal parts by silver-gray-colored epoxy castings has been accomplished by one of us. If so, please bring in the set that incorporates that restoration. An entry should be accompanied by documentation showing the basis of the update that preserves the quality of the original.

24. NEW OR REBUILT
Previously we have encouraged entries that showed the conference attenders how substitutions and reconstructions would provide vital parts or pieces. We also encouraged craftsmen who had made an old function come alive again to bring their work for review. Do you remember the Federal receiver that was entered several years ago and the operating Marconi coherer detector from the year before last? We want to continue that tradition so bring in your retrospective designs and your reconstructions. There is no requirement for particular devices or circuits.

THE CONTEST AWARDS

Elle Craftsman Given in memory of Bruce Elle to a builder of a high-quality radio receiver of an old or new type.

Matlack Transmitter Given for excellence in constructing or restoring transmitting equipment.

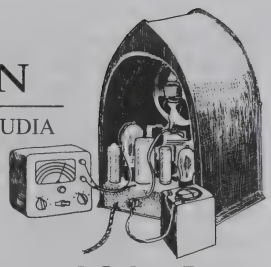
Display Recognizes the informational value and quality of an exhibit in the contest at the AWA conference.

Thompson Best of Show Awarded in honor of early amateur Eunice Thompson, W1MPP, for the top entry in the Old Equipment Contest at the Annual Conference.

People's Choice Awarded to the entry that receives the most favorable votes from attenders and visitors to the contest. All entries including displays are eligible for this award.

EQUIPMENT RESTORATION

EDITED BY **KEN OWENS**, 478 SYCAMORE DR., CIRCLEVILLE, OH 43113CLAUDIA
radiowd11@yahoo.com
PLEASE SEND CORRESPONDENCE DIRECTLY TO THE ABOVE ADDRESS, INCLUDING SASE FOR REPLY.



Replacing Burned-Out P-P Output Transformers and Other Lore

The radio restorer often finds that half of the driver transformer secondary is open in transformer-coupled P-P output stages, causing one of the tubes to get no signal. Triode tubes require a lot of driving voltage. The rule of thumb is that maximum output occurs when the driving voltage equals the grid bias. Grid bias in the typical P-P 45 output stage runs 50-65V. For adequate volume, the driver transformer often needs a step-up ratio as high as 10:1.

Such transformers are not easy to find, nor are they easy to replace in sets like the Atwater Kent Models 55 and 60 where everything is potted in tar. Langford-Smith in *Radiotron Designer's Handbook,* (4th Ed.) gives a circuit for P-P pentode tubes where signal for the lower tube is taken from the unbypassed screen of the upper tube. Philco used this circuit in their Model 40-180 and Echophone used it with triodes in their 1931 Model F.

The signal on the screen (or plate) of the upper tube is 180° out of phase with the grid signal. If some of this signal is used to drive the grid of the lower tube, phase inversion is built-in. Distortion is high because the inverted signal is taken off before cancellation in the P-P output transformer.

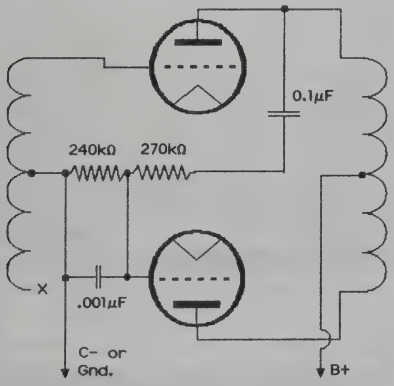


Fig. 1. Circuit for temporary replacement of a push-pull output driver transformer with half of its secondary open.

I simulated an open secondary half in an AK Model 55 by disconnecting the transformer lead to one tube at X (see Figure 1). Then I installed the R-C network shown to obtain drive for the lower tube from the plate of the upper one. After trying different values for the resistors and capacitors, I arrived at the indicated values. It works. The 'scope shows the expected higher distortion compared to the original circuit, but it doesn't sound bad. The .001 μF capacitor is needed to suppress a tendency towards high frequency oscillation at high output levels.

This fix will get your set going until you can find a replacement transformer. The added components can easily be removed at that time and the set restored to original.

♦ ♦ ♦ ♦

Michael Rakochy (Allentown, PA) sent in some useful tips. He uses a little transistor radio as a signal source to troubleshoot audio amplifiers in radios. He gets the signal from the earphone jack on the transistor radio. He uses a plug with a 8-10 Ω resistor across it to provide a load and then a small blocking capacitor in series with the test leads to keep set DC off the transistor radio. It can be attached to plate or grid terminals to test the amplifier with actual program material.

Michael also points out that factory-wired Variacs have the fuse in the output lead. That's because, depending on the setting of the unit, very large output currents can be drawn without exceeding the limits of a fuse placed at the input. You could burn out a portion of the winding and never blow the fuse. Good advice for those who have Variacs incorporated into test equipment.

♦ ♦ ♦ ♦

Atwater Kent battery sets used only one carbon resistor and, until 1929, the AC sets used only 3. These consisted of a carbon element

in a glass tube with metal ferrules on the ends. They were held in clips like a fuse. In 1929, A-K redesigned their chassis and went to resistors with the carbon element inside a white ceramic tube with lead wires embedded in cast metal end caps. They used many more resistors and devised a house code consisting of colored bands to identify them. Since each color combination is unique, the order in which the colors are read is not important. The code is shown below.

ATWATER KENT CARBON RESISTOR COLOR CODE (1932)

Black	65 KΩ	Green	2 MΩ
Black-blue	1100 Ω	Green-blue	4000 Ω
Black-green	65 KΩ	Green-red	3300 Ω
Black-purple	500 KΩ	Green-yellow	900 KΩ
Black-red	20 KΩ		
Black-red-blue	1100 Ω	Maroon	10 KΩ
Black-yellow	40 KΩ	Maroon-blue	300 Ω
Black-yellow-red	50 KΩ		
		Purple	6000 Ω
Blue	100 KΩ	Purple-red	12.5 KΩ
Blue-gray	1 MΩ	Purple-yellow	12.5 KΩ
Blue-red-green	500 Ω		
Blue-yellow	5000 Ω	Red	12.5 KΩ
		Red-blue	100 KΩ
Gray	30 KΩ	Red-gray	800 KΩ
Gray-green	15 KΩ	Red-yellow	250 KΩ
Gray-yellow	15 KΩ		
		White	40 KΩ
Yellow	500 Ω		

♦ ♦ ♦ ♦

Another interesting "fix" comes from George Capen (***OTB***, Vol. 22, #4, Mar 1982). He describes a transistor amplifier designed to replace audio transformers in audio amplifiers. It is shown in Fig. 2. Parts values are:

R1, R2 - 22k	C1 - 5 µF Tantalum
R3 - 150k	C2 - 20 µF Tantalum
R4 - 15K	C3 - .01 µF/100V
R5 - 18k	D1 - 12V 1W Zener
R6 - 1500	Q1 - 2N3905
R7 - 220k	

I built this circuit and tested it with the following changes. Tantalum capacitors were probably specified for their small size, but I used ordinary aluminum ones. The rating of C3 was increased to 400V because the potential across it can exceed 100V when the plate supply is over 100V. A higher gain 2N3906 was used because I didn't have a 2N3905 on hand.

The operating power comes from the voltage drop across R1. It is filtered by R2 and C2 and stabilized against fluctuations by the Zener diode. Signal is coupled through C1 to the base of the 2N3906 in a common emitter amplifier circuit and then to the grid of the following tube through C3. R7 provides the grid return path.

Capen states that the gain of the circuit equals that of a 1:3 audio transformer. I found the gain to be approximately 8.2 when used between two 01A tubes with 90V on the plates and -4.5 V bias. Experimentation showed that R4 should be reduced to 8.2 KΩ for a gain of 5 and to 5.1 KΩ for a gain of 3. These gains approximate those of the most commonly used transformers. Distortion occurs when the input signal exceeds 1V. The size of the completed unit can be seen in Fig. 3.

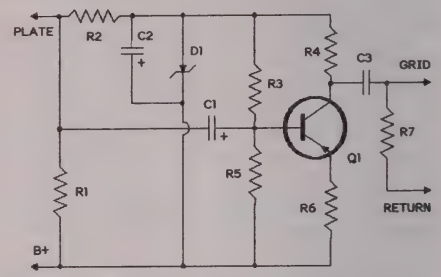


Fig. 2. Transistor circuit for replacing burned-out interstage audio transformers. See text for parts values.

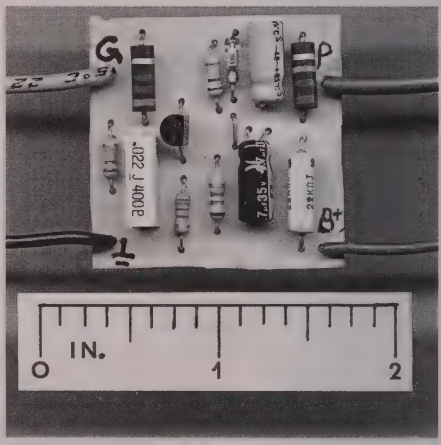
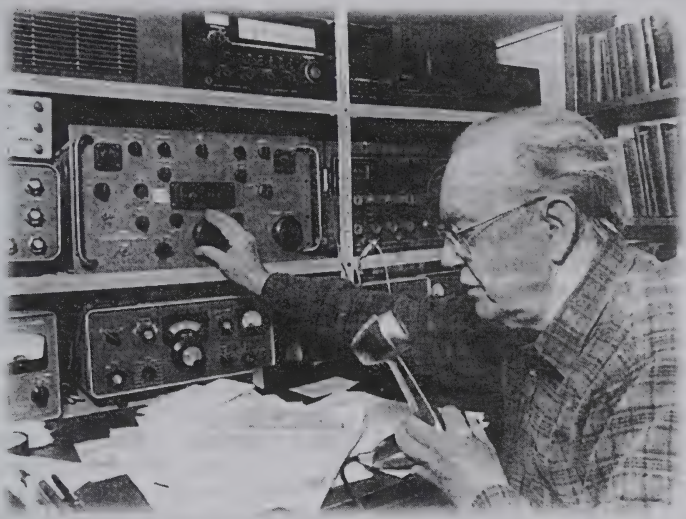


Fig. 3. A completed transformer replacement using the circuit of Figure 2.

Remembering Ralph Williams

By His Friends and Associates



Ralph at the ham station in his Orient Point home. Photo courtesy Elinor Williams.

Ralph Williams, N3VT, passed away on May 31, 2002, at the age of 81, after a long battle with cancer. Ralph's name is closely associated with that of the largest radio manufacturer of the 1920s: Atwater Kent. For more than 30 years, Ralph collected and studied AK artifacts, preserved the history of the company by interviewing people who were involved with it, and shared his knowledge through published articles and books.

But this was only one facet of his remarkable personality. Ralph was also a brilliant electrical engineer who rose to a high position during a 33-year career at General Electric, an able historian who specialized in early Long Island houses, a teacher, a father, and a grandfather. He enjoyed associations with groups having similar interests, and was a long-time member of the Antique Wireless Association, the Radio Club of America, the Peconic Amateur Radio Club, the Suffolk County Historical Society, the Southold Landmarks Commission, the Suffolk County Historic Preservation Committee, and the Friends of Long Island Wireless History. In addition, he was a consultant for the Atwater Kent Museum in Philadelphia.

Ralph was born in 1920 in the Bronx, New York. Shortly thereafter, his family moved to suburban Keansburg, New Jersey. The impressions of their New Jersey house, built in the "American Four Square" style popular in the first years of the 20th century, would stay with him for life. Another early impression that made a major impact was a visit, arranged by an uncle, to the Schenectedy works of General Electric. After seeing the factories in which radios and small electrical devices were assembled, and visiting the test area where large machinery was put through its paces before shipment; Ralph knew he wanted to be an electrical engineer—and work for GE!

Following graduation from high school, Ralph entered the engineering program at Cooper Union in New York City. Cooper Union does not charge tuition, but a rigorous exam must be passed to earn a place there, and high grade levels have to be maintained in order to stay. He also had to work part-time to support himself, but he remembered those years as an exciting and exhilarating time of his life. At the end of his third year of college, in June, 1943, he volunteered for the Army Signal Corps. After graduating from OCS, he received additional training in radar and microwave technology at Harvard and MIT before joining a radar platoon that was shipped to China to track Japanese air traffic.

After the war, Ralph went to Northeastern University in Boston to finish his BSEE. As part of the school's work/study curriculum, Ralph obtained a job designing and building antennas for Workshop Associates in Newton, MA. After graduation in 1947, the campus recruiters from GE were delighted to find out that their top candidate considered GE his first choice as well.

The first thing Ralph did at GE was to complete their course in advanced engineering. As America converted from war production to a peace economy, it was obvious that television and FM radio were going to be major growth areas. GE decided to get involved in the broadcast equipment business, and they needed engineers who were familiar with VHF, so Ralph went to work installing radio and TV stations.

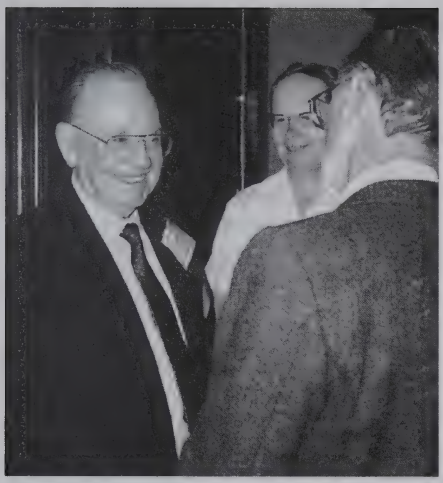
One project he remembered fondly was building a network in upstate New York for the Grange League Federation (now Agway), to bring agricultural news to farmers. He was also briefly involved with GE's line of two-way radios and telemetry systems for pipelines.

His next assignment, from 1949 until 1953, took him to White Sands, New Mexico. When the war in Europe ended, the Army had captured a number of German V-2 rockets in varying states of readiness. It wanted to fly the rockets so their characteristics could be learned, and the experience applied to American missile programs. General Electric won the contract to make the German rockets operational and assist in the launches. This work led directly to the American Hermes guided missile program, in which Ralph became fully qualified as a "rocket scientist."

As the Cold War began, Ralph was called on to build a very special television installation for the U.S. government. It was believed that the Russians were developing intercontinental ballistic missiles, or ICBMs, but no proof could be obtained from beyond the Iron Curtain. Ralph was placed in charge of installing ten television transmitters in eastern Turkey. The installation included a dish antenna that was the size of a football field and a diesel power plant to operate everything. Transmitting only the TV sync pulses, the system actually functioned as a long range radar which could monitor the Russian missiles in flight. Enough evidence was gathered from the supersecret installation to convince the U.S. Congress of the need for an American ICBM program.

Ralph then managed GE Field Service units at Cape Kennedy and Vandenberg Air Force Base.

Ralph with Peter Kent (left), Atwater Kent's grandson, at the 1996 AWA Conference. Photo courtesy Lauren and Joyce Peckham.



Chatting in hallway at 1995 AWA Conference. Fellow historian Alan Douglas in background. Photo courtesy Lauren and Joyce Peckham.

It was in Santa Barbara that he met his wife, Elinor, who was also a GE employee. GE became a prime contractor for ICBM components and built a new aerospace research facility in King of Prussia, Pennsylvania, to which Ralph and Elinor moved in 1965. Despite the work load and family obligations, he found the time to earn a Masters in Information Theory at Penn State. His thesis was on the information capacity of Morse Code. When he retired from GE in 1980, Ralph held the title of Senior Project Engineer in the Re-Entry Systems Department. He continued on a consulting basis for another seven years and was called out of retirement one last time in 1993 to work on a study that was done to advise Congress on the future safety and viability of the Alyeaska Oil Pipeline in Alaska.

Ralph's interest in antique radios started in a way that would make most collectors smile. As a boy, somebody had given him a defunct radio to experiment with. Ralph remembered it as an Atwater Kent model 20 compact with an AK horn speaker. He was unable to get the set working, and it was eventually taken apart. Although that was a common fate for old radios before they had any desirability as collectibles or antiques, he always regretted it.

In the early 1960s, a few people began to realize that radios and related artifacts of the 1920s and earlier were in need of preservation. The word "antique" normally implied something at least 100 years old, but technology was changing much faster than ever before, and it was feared that the history of radio's early days could would be lost long before the dictionary definition of antique was reached. After his transfer to GE's aerospace research facility, Ralph came across another old radio, which he kept and got working. That radio led to another, and another, and he soon had a collection.

Ralph did not start out seeking Atwater Kent radios at first. He acquired the sets most collectors of the 1960s and '70s were interested in: early products of RCA, Grebe, Western Electric, Kennedy, and others, including Atwater Kent. He joined the AWA and received a great deal of encouragement from other early collectors. In time, Ralph took on, organized, and ran the Old Equipment Contest at the annual AWA convention, turning it into one of the major attractions there every year. Combining his interest in Morse Code with his love of radio, Ralph obtained his amateur license in 1966, and as N3VT, used both to stay in touch with his AWA and GE friends.

As the collection grew in the basement of their home, word went around the neighborhood that Ralph and Elinor had a radio museum, and visitors were welcome. But Ralph realized that the collection needed some sort of theme or specialty. Ironically, he did not consider doing this with GE radios. Almost all of the radios manufactured by GE in the 1920s were sold by RCA, and were considered RCA products. Instead, he decided to specialize in radios made by Pennsylvania companies.

Not long after he started working on Pennsylvania radio history, an event took place which made, and would forever keep, Atwater Kent at the center of his efforts. A local newspaper ran a story on Ralph's radio museum, but the reporter had referred to it as an "Atwater Kent museum."

A few days later, Ralph got a phone call from a lawyer representing the Atwater Kent Foundation. Although the company had stopped manufacturing radios more than 30 years earlier, the name was still a registered trademark and Ralph would be subject to prosecution for using it without authorization. Ralph tried to assure them that the collection had a few Atwater Kent radios in it, along with many others, but the name was not being used in connection with the museum.

Ralph finally convinced the lawyer and anybody else who was interested to come see for themselves, which led to a visit from Arthur Atwater Kent Jr., son of the founder! Ralph and Elinor became good friends with Atwater Kent Jr., and were eventually given access to Kent family history, records, and artifacts that were otherwise inaccessible. Ralph incorporated much of this material in his writings on Atwater Kent, particularly in Volume 12 of *The AWA Re-*

view, "The Atwater Kent Radios," published by The Antique Wireless Association in 1999. Some of his other Atwater Kent articles appeared in *Radio Age*, various issues of the AWA *Old Timer's Bulletin*, and Volumes 1, 2, 3, and 10 of *The AWA Review*.

In 1980, Ralph and Elinor decided to buy her family homestead, the Terry-Mulford House, which is located on the eastern tip of Long Island's north fork at Orient Point. The original section of the house, built in 1639, is the oldest structure on Long Island. Another section was added in the early 1800s, and a large three-story addition with a grand banquet hall had been built in 1910.

The house had not been occupied since the 1940s, and a tremendous amount of work was needed to make it habitable again. However, the banquet hall, with its high ceiling, ornate woodwork, and stained glass windows was an ideal setting for the radio museum. Not trusting movers to handle his delicate radios, Ralph made innumerable trips in an old Volkswagen microbus to transport them from Valley Forge to Orient Point a few at a time. Deciding to name it "The Voice of the Twenties," Ralph and Elinor formally dedicated the radio museum in 1985.

With all the work to do on not one, but three old houses, Ralph had another outlet for his historical interests. The middle section of the house, which dates to 1815, became Ralph and Elinor's living quarters. The original 1639 house, which was on the verge of collapse, became another museum after Ralph and Elinor put years of hard work into restoring it, internally and externally, to its condition around the time of the Revolutionary War.

Ralph was determined to restore it as accurately as possible, and did extensive research on the materials, construction techniques, and furniture of the era. He became an expert on early houses, and got involved with the Suffolk County Historical Society, the Southold Landmarks Commission, and the Suffolk County Historical Preservation Committee.

Ralph never offered unasked-for advice, but he was always glad to help anybody with questions or problems brought to his attention, whether the subject was antique radio, modern technology, old houses, or almost anything else. He had a natural feel and keen insight for working with and getting along with others, and many of his younger friends considered him a mentor. Not long ago, an acquaintance who is not a collector asked why anybody would need an antique radio. Ralph thought about it for a moment and said, "Well, why does anybody need ice cream?"—*Christopher Bacon*

Personal Recollections Of Fellow AWA-ers

With so little time, it's difficult to put together a writeup that would really do justice to the contributions Ralph and his wife Elinor have made to AWA, and particularly to the Old Equipment Contest at our annual conference. I met Ralph back in the 1970s, when he was involved in the ARCA (Antique Radio Club of America) early equipment contests. Somewhere along the line, Bruce Kelley and I came up with the idea of making him permanent chairperson of all future AWA Old Equipment Contests. Ralph immediately involved Elinor and tapped the talents of many other fine and qualified persons.

The result is well known to any member who has since entered or viewed one of these contests. The professionalism and scope of our contest entries are second to none. Thanks to Ralph's foresightedness, our contest this year and in future years will not lack leadership. Early on in his tenure as contest chairperson, he recognized the talents of Geoff Bourne and made him his assistant. A few years ago, Geoff became chairperson, with Ralph remaining in the picture to advise and assist as needed. Now Geoff is ready to see that the AWA Old Equipment Contest continues with the same high standards.

Ralph's interest in the Atwater Kent Company is well known to all. His Atwater Kent museum is the best of its kind anywhere, reflecting his years of studying the firm and its products.

—Lauren Peckham, Director, AWA

• • • • • • • •

Before Ralph took over the AWA Old Equipment Contest, it was essentially a "show-and-tell" affair, with members exhibiting favorite radios and other artifacts—usually without formal explanation or documentation. By including documentation quality in the judging criteria, Ralph encouraged us to include technical and historical information—making our exhibits true learning experiences for the viewers. Ralph also used his creativity and organizational ability to develop a wide spectrum of challenging contest

categories that sparked members' imaginations and stimulated many to begin creating their exhibits months in advance of Conference time.

—Dick Brewster
Contributing Editor, The OTB

• • • • • • • •

I first met Ralph Williams at an ARCA convention in Louisville, Kentucky. He was running the old equipment contest and I had an entry. A friend of mine and I had just restored a Bremer-Tully Counterphase, and we were eager to show the beautiful radio. We had completely refinished the cabinet and polished all of the copper shields until they glowed. But we didn't even get a ribbon. We were heartbroken and our enthusiasm was crushed.

Seeing our dismay, Ralph came over and talked to us about why the radio did not win anything. He explained that when you restore a radio there is no harm in letting it show its age. After all, if something has been around for sixty plus years it is bound to have a few dents and dings in it.

We went away feeling better about the contest and we learned something about radio history. This is a good example of what I most remember about Ralph. He would always try to teach you something and he always wanted to learn things himself. He never stopped on his quest for knowledge.

Over the years we became very good friends and he involved me in both the ARCA and the AWA contests. I now head the AWA contest. We always had a good time discussing and learning from the artifacts. We would always try to show a disappointed entrant why he didn't score higher and help him correct the problem for the next event. In the end he usually left with a smile on his face.

The most important things that I learned from Ralph were never to stop learning and always listen. He will be missed.

—Geoffrey Bourne,
First Vice President, AWA

• • • • • • • •

In 1978 Ralph and Elinor came down to Winston-Salem to give a talk on Atwater Kent. The one thing that stuck in my mind was that, in addition to the vintage AK equipment, he had brought along a tape deck to play excerpts of vintage radio broadcasts through some of his display radios. The point being that he took the time to place the manufacture of the AK hardware in the context of events surrounding the ordinary men and women living in America at the time.

This convinced me it is not enough just to know how something is built and to enjoy fixing it up after years of neglect. It is much better also to learn about the individuals involved in the radio business, the science behind the products and the social and political environment in which these products became such an important part of so many people's lives.

Speaking of the same meet, Ron Lawrence adds, "This was my and Brian Harrison's first radio meet. One of the few that both of our wives attended. I remember sitting right in the front row at the dinner and audibly gasping when Ralph flipped the sheet off of the AK-5. It was the first one I had ever seen "in person."

—Robert Lozier

• • • • • • • •

I enjoyed many years of friendship with Ralph, especially when he wrote a series on Atwater Kent for my publication *Radio Age*.

We had been corresponding during the last two years about reprinting this series. I sent Ralph the proofs just a few weeks before he died, but by then he was very weak from chemotherapy. However, the book should be out some time this fall.

—Don Patterson

• • • • • • • •

Ralph was a key member of the core AWA team for a long time and I have known him well for close to 30 years. I for one will truly miss him. He was a great engineer, collector, and radio historian. He had a sense of ethics not often found anymore and was a true gentlemen. His dedication and fairness in running the AWA equipment contest for many years is unprecedented. It was an often controversial and thankless task, but he and Elinor performed it religiously year after year.

—Mike B. Feher, N4FS

• • • • • • • •

I probably won't be the first to suggest it but I would like to see the Old Equipment Contest at the AWA conference be named the Ralph O. Williams Equipment Contest. During the 25 years I have been a part of the AWA scene Ralph and Elinor tirelessly put their considerable time and effort into this endeavor. I have never called on Ralph with questions but what he treated me as the most important person at the moment, always knowledgable, helpful and willing to take the time to find an answer for me. He was a true historian and writer the likes of which we probably won't see again. I feel very fortunate his life span coincided with part of mine.

—Merrill Bancroft

EDITED BY **JOHN CASALE**, W2NI, 3 PICKERING LANE, TROY, NY 12180
PLEASE INCLUDE SASE FOR REPLY.

John C. Barclay: Western Union's Chief Engineer, 1902-1910

John C. Barclay was best known in his lifetime by his inventions associated with printing telegraphy. Yet he received 38 U.S. Patents covering a wide range of telegraph inventions. Some of his lesser-known inventions and improvements are very interesting to examine. Many of them became industry standards because of the high-level positions Barclay held with Western Union.

John C. Barclay

Barclay was born in Greensburg Pa. in 1856. When he was twelve, he worked as a messenger for the Pennsylvania Railroad in Greensburg and found time to study telegraphy in addition doing his school work. At fourteen he was hired as a telegrapher for the Pittsburgh and Connellsville Railroad. Three years later he moved to Elizabeth, N.J. and became, first, Assistant Train Dispatcher for the Central Railroad of New Jersey, then an inspector for the automatic fire alarm system used in New York City.

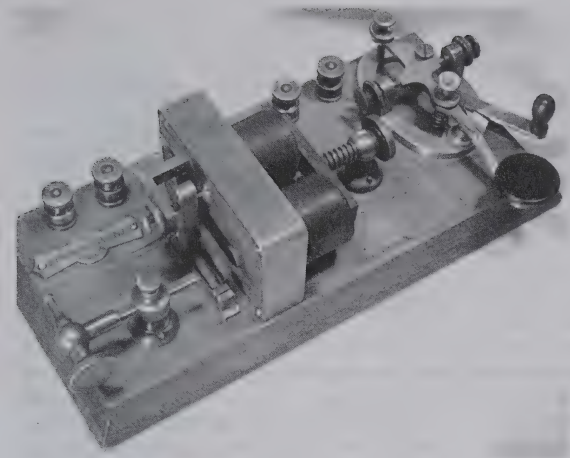
His first association with Western Union was in 1875 as a telegrapher in Baltimore. Shortly thereafter he moved to Chicago to work for the American Union Telegraph Company. By 1882 Western Union absorbed American Union and, until Barclay's retirement 28 years later, he remained associated in some way with Western Union.

Telegraphers typically jumped around from job to job during their careers, but Barclay's next move was not typical. While working as a telegrapher in Chicago, he studied dentistry in his spare time and in 1887 received the degree, Doctor of Dental Surgery. For the next eleven years he practiced dentistry in Chicago, but at night worked as an office manager for Western Union and studied engineering.

One of his experiences as a night manager in Chicago received national attention during the 1894 Pullman railroad strike. Barclay was instrumental in having federal troops dispatched to a nearby burning rail yard by telegraphing riot conditions directly to the White House, where they were reported to President Cleveland.

In 1898 Barclay gave up his dental practice to accept a high-level engineering position with Western Union, where he was responsible for operations west of the Mississippi. Four years later, his old boss Robert Clowery became the president and general manager of Western Union and transferred Barclay to New York City, promoting him to Chief Engineer. A year later, at age 47, Barclay also became the assistant general manager of Western Union. Barclay is probably best recognized today as the inventor of the Barclay Box Relay. A Morse relay by itself is relatively quiet, and not practical for use in copying Morse. However, by enclosing the instrument in a wooden box and having the relay lever strike against it, the sound was amplified to a useable level.

A box relay required no local battery and could operate from weak currents directly off a main line, making it ideal for portable use. Earlier box relays consisted of a conventional Morse relay sealed in a simple box that would resonate the sound produced by the action of the relay's lever. Barclay improved this design by using a



Barclay Box Relay

shallow brass box with a wooden diaphragm, making it similar to a snare drum.

The "drum" was attached on its side to the instruments's base with the magnets partially enclosed, making them accessible instead of being sealed as in the older units. The openings for the magnets also helped to port the sound away from the "drum." To increase the striking effectiveness of the lever, he used steel instead of platina (platinum) contact points and selected hard maple instead of cherry or mahogany for the diaphragm. Barclay's Box Relay was produced in two configurations. The most common was the relay with a key on the same base, but it was also available without the key for use as a stand-alone relay/sounder.

Two wiring options were available for each. In one, four binding posts were included, just as in a conventional Morse relay. Two were for connecting the magnets in series with the main line; two were for utilizing the relay's normally-open SPST contacts. The latter option allowed for a local series circuit, consisting of a battery and sounder, to be driven by the relay.

The other option provided just the two magnet binding posts. Barclay favored this option because he felt that if the box relay was truly efficient, "it will do the work expected of it" and not require the local circuit.

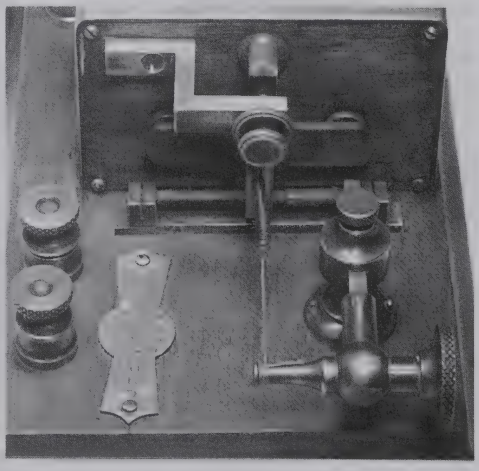
For dating purposes, Barclay's Box Relay was introduced in 1903 and The Bunnell Telegraphic and Electrical Company had exclusive rights to it. Barclay Box Relays with "Bunnell Tel. & Elec. Co." markings are the most uncommon, as the company was in the process of merging with J.H. Bunnell & Co. that year. The Box Relay was manufactured for several years by Bunnell and even today makes for an ideal portable or demonstration piece.

You may have noticed the patent date of July 21, 1903 stamped on the magnet yoke of some Western Electric Morse relays. This date refers to a Barclay patent for improvements to relays. The improvements were picked up by several manufacturers and were found in relays for many years. A Barclay improved relay can be quickly identified by the trunnion bracket supporting a one-piece pinned iron armature.

The Barclay trunnion bracket eliminated trunnion set screws but, more importantly, the shoulder of the bracket acted as a stop for the magnets, preventing an operator from over-adjusting the magnets directly onto the armature. This would sometimes crack the armature at the trunnions. The Barclay bracket was still being used in 1945, as shown in the picture of the Morse relay built by J.H. Bunnell & Co. for the Signal Corps dated August 1945.

Barclay made a very subtle improvement to vertical adjustment posts used on telegraph instruments with wooden bases. The 1903 improvement was the fitting of vertical posts with two pins that sank into the wood, preventing the posts from twisting. One has to think he was drawing upon his dental experience for this idea.

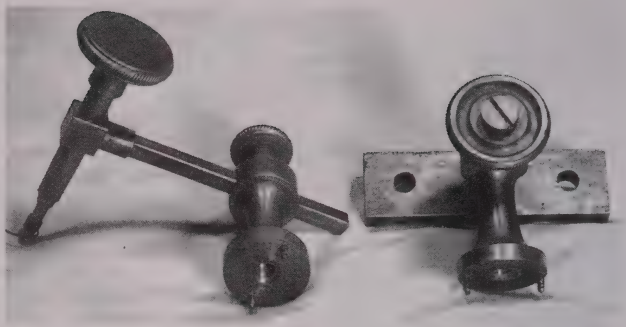
This simple improvement gives today's collectors a very useful dividing line for dating instruments. Most vertical adjustment posts used



Diaphragm and lever of Barclay Box Relay

on wood-based telegraph instruments built after 1903 incorporated Barclay's pins.

An insulator invented by Barclay and used on telegraph lines throughout the U.S. is shown with this article. When a telegraph "line wire" was installed from pole to pole it was held against the side of an insulator by a short piece of wire called a "tie wire." Barclay's invention allowed for the quick replacement of an insulator without having to unwrap the tie wire and, more importantly, without disturbing the line wire.



Barclay's pins, used on wood-based telegraph instruments after 1903, can be seen on the base of these vertical adjustment posts.

The Barclay insulator had a spiral groove above the line wire's circular groove that was threaded opposite from the insulator's internal thread. To replace the insulator, a slight upward pressure was applied to the tie wire while the insulator was unscrewed. This caused the tie wire's loop to move up to the spiral groove, then off the insulator.

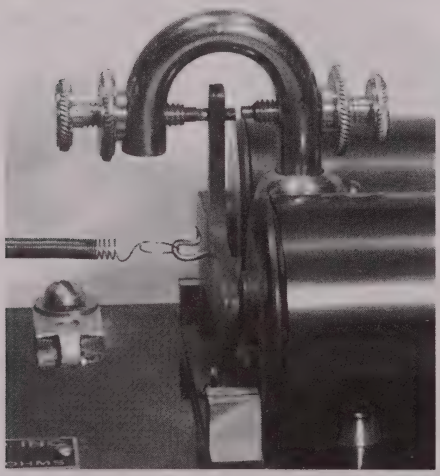
In the reverse operation, the new insulator was screwed into the tie wire's loop. Once the tie wire was down in the line wire's groove, the insulator could be fully screwed onto the supporting wooden pin of a cross arm.

Barclay's inventions and improvements mentioned so far, although important, were not as significant as his engineering contributions in the field of printing telegraphy. During the period of 1905-1908, Barclay received several patents, some of these comprised what was known as the Barclay Printing Telegraph System. Western Union's interest in printing systems was accelerated by the telegrapher's strike of 1907.

Barclay's invention became Western Union's first practical typewriter page-printing system used on a large scale in the U.S. In his system, six pulses were required to transmit a single character—three negative marking pulses and three positive spacing pulses of different durations.

To transmit a telegram, two methods were possible. One was by direct keyboard entry using a machine that looked and operated like a conventional typewriter. This instrument could transmit directly to the line. The other was to cre-

(continued on page 56)



A 1945 Morse relay showing the magnets being stopped by Barclay's trunnion bracket.

A Barclay "twist" insulator. Note the spiral groove above the line wire's circular groove.

New Books and Literature

DAVID W. KRAEUTER, 506 E. WHEELING ST., WASHINGTON, PA 15301 E-MAIL KRAEUTER@SGI.NET
PLEASE INCLUDE SASE FOR REPLY.

Books to be reviewed in this column should be sent directly to David Kraeuter at the address above. After review, all such books become a permanent part of The AWA Library, which is part of The AWA Electronic Communication Museum and is available to members for browsing and research.

AWA Review, Volumes 1-5, Compact Disc Edition

Order from AWA Museum, 187 Lighthouse Rd., Hilton NY 14468. Checks or money orders payable to "AWA Museum," $19.95 ppd. US and Canada. Elsewhere, add $3.00.

The first five volumes of the *AWA Review* are out of print and unlikely to be reprinted in paper form. They get more scarce with each passing AWA convention.

Help has arrived. Even if your collection is missing only one of these volumes it makes sense to buy this CD to fill the gap. The CD appears to have been produced with the same care and at the same quality level as the CD version of the *OTB*. Requirements are a PC or Mac with Adobe Acrobat 4.0 or greater. The PC version of Acrobat Reader is included on the disc.

Though unfortunately the disc is not searchable at the single word level, it does include Ludwell Sibley's thorough index file, which can be searched by word. As a bonus, Lud's index covers all AWA publications through about the year 2000.

A big advantage of having the *Review* on CD is what librarians call file integrity. You're assured of no missing pages, no missing articles. At 741 pages total—something over two cents per page—this is bargain amateur history stuff.

♦ ♦ ♦ ♦

Sir Oliver Lodge, Psychical Researcher and Scientist

By W. P. Jolly. Published 1975 by Fairleigh Dickinson University Press, 285 Madison Avenue, Madison, NJ 07940, tel. 973-443-8564, E-mail fdupress@fdu.edu. 5 1/2 by 8 1/2 inches, 256 pages, hardcover, $35.

Lodge's long active life (1851-1940) was divided among very many interests, one of which was the newly-founded study of electromagnetic waves. Just as waves in a fluid, such as water, could not exist without the water, so too it was thought there must be a medium by which electromagnetic waves existed. This mysterious substance was called ether, and Lodge studied it during much of his adult life.

He devised an experiment to determine whether a large rotating object would pull or drag the surrounding ether along with it. The experiment used two heavy, closely-spaced one-meter-diameter steel discs, each spinning at up to 4,000 rpm. Some danger was involved. "Since the optical measurements were made with [Lodge's] head...in the same horizontal plane as the spinning discs, the nature of the possible disaster was uncomfortable to contemplate." Though the experiments lasted for years, Lodge survived and no indication of ether drag was found. Einstein would later use the results of Lodge's work in the formation of his famous theories.

Think of Lodge the next time you tune in a station on your radio or TV. His most important contribution to radio circuitry was the resonating circuit that allows a radio to select just one of the many stations that may be available to it. Some think that Lodge, rather than Marconi, should be credited with the invention of radio. Indeed Marconi got his famous 7,777 tuning patent in 1900, but Lodge got his less-than-famous tuning patent in 1897.

Lodge won credit for his work only through a trial, which extended his patent through 1918. Marconi's company bought Lodge's tuning patent after the trial. Jolly portrays Lodge as a kind and gentle man, and says that Lodge bore no feeling of ill will toward Marconi. He could, however, bridle at the term "Marconi waves." If an eponym were needed, Lodge much preferred "Hertzian waves."

For other views of Lodge's contribution to radio, see the collection of essays edited by Peter Rowlands and J. Patrick Wilson titled *Oliver Lodge and the Invention of Radio* (Liverpool: PD Publications, 1994).

Of Lodge's many non-radio interests one of the more bizarre was spiritualism, which in Victorian times meant communication with the spirits of dead people, especially relatives. (Lodge certainly had ample opportunity here; his father had 24 brothers and sisters.) Another long-time investiga-

tor of spiritualism was William Crookes, who was one of the inventors of the CRT, the discoverer of thallium, and the inventor of the radiometer.

Lodge believed he had confirmed or demonstrated communication with the dead, but realized he'd have an extremely difficult time convincing the scientific community. The general public was another matter. Lodge's book *Raymond*, about his attempts to communicate with his son who had been killed in the Great War, caused something of a sensation and became what would today be called a best-seller. The popularity of the book was doubtless caused in part by the grief of the many people who had lost relatives in the War.

At his death Lodge left a deliberately unfinished experiment designed to test or demonstrate the truth of spiritualism. He left a packet of seven sealed envelopes of different sizes, each envelope containing the next smallest, and each bearing clues as to the message in the smallest envelope. That message was known only to Lodge. These clues were to help mediums, people who were supposedly sensitive to communication with the dead, in communicating with Lodge's spirit. The envelopes were opened successively between 1947 and 1954. Jolly reports that the results of the experiment were inconclusive "to the uncommitted observer."

Jolly repeatedly states that Lodge brought to his spiritualism studies the same rigorous scientific methods he used in his studies of electromagnetic waves. But the question remains: how could men of Crookes' and Lodge's obvious intellect and devotion to reason be so caught up in spiritualism? I don't know the answer, but for a thought exercise of our own I'll end this review with David Hume's famous sentence, "Reason is, and ought only to be, the slave of the passions."

♦ ♦ ♦ ♦

Tesla, Master of Lightning

Produced and directed by Robert Uth. PBS Home Video B8419, 2000, VHS videocassette, 90 minutes. Available from amazon.com. $14.95.

Tesla, of course, did not master lightning. What he mastered was polyphase AC power generation, distribution and use. But try putting *that* into one short catchphrase for a subtitle.

This video documentary makes a nice companion to either of the Tesla biographies reviewed in the May 2002 *OTB*. The use of Stacy Keach's voice as the voice of Tesla adds a nice touch of Tesla's old world charm and his sense of the dramatic.

Note: the famous photograph of Tesla reading while sitting in a chair with lightning bolts surrounding him involved some legerdemain, in this case multiple exposures. Tesla was *not* sitting that close to the lightning bolts when they were photographed. Hence this picture should not appear in a documentary without explanation.

♦ ♦ ♦ ♦

Armstrong, Edwin H. "A Study of the Operating Characteristics of the Ratio Detector and Its Place in Radio History," *Proceedings of the Radio Club of America, 25:1-20 (1948).*

Just as there are seminal books in the electrical engineering field, so too there are seminal papers. This paper by Armstrong, though not of prime value, is still important for two reasons. First, it is his public refutation of the originality of the ratio detector circuit, and second, it gives us an all-too-rare glimpse into his humanity.

Armstrong begins his paper with an historical precedent. His 1912 invention of the regenerative circuit had become well-known by late 1913. Early in 1914 Lee De Forest announced his invention of the ultraudion circuit, which he claimed was not a regenerative circuit but achieved the same results. But by simply redrawing de Forest's ultraudion circuit to include coupling and the inter-element capacitance of the tube, Armstrong was able to show that the ultraudion circuit was in fact his own regen circuit in disguise. Regardless, the U.S. Supreme Court (if not the electrical engineering community) ultimately found in favor of De Forest in 1934.

Then Armstrong turns to the main subject of his paper. In the early 1930s he had developed and patented his system of noise-free wide-band FM radio using limiter and discriminator circuits. Acceptance of Armstrong's FM inventions occurred not nearly as fast as with the regen circuit, which could quickly be incorporated into receivers and required no modification of the transmitting circuits. FM, however, required a complete new system. For years it must have seemed to Armstrong that no one cared or was listening when he promoted his new noiseless system.

But obviously someone was listening, for by 1947 David Sarnoff and RCA engineers, particularly Stuart Seeley, introduced a circuit which purportedly did the same thing as Armstrong's FM circuits, but, again, in a unique way. Seeley's circuit was called the ratio detector, and RCA was able to get the circuit patented despite Armstrong's earlier patents. (See my "Seeley Bibliography" in the *Pittsburgh Oscillator*, 16:12, December 2001.)

For Armstrong it was to be, as the redundant saying goes, "*déjà vu* all over again." Once more

he found himself on the defensive. And once more, by a logical step-by-step redrawing of the ratio detector circuit, he was able to show that it was in fact merely a variation of his own original limiter/discriminator design. But when this paper was published in 1948 Armstrong still faced years of frustrating, expensive litigation with RCA over his FM circuits.

Note by the title of the paper that Armstrong wished to show the place of the ratio detector in radio history. He does that none too subtly on the last page. Just who might Armstrong have had in mind when he ended his objective, technical paper with this surprising (but still carefully footnoted) fillip?

That prophecy [made by Armstrong] was that the day would surely arrive when the direction of engineering by the members of the legal profession would come to an end, because the unholy mess that they had made of radio would soon be apparent to everyone. The writer [Armstrong] predicted that engineering would again be directed by engineers, and he even ventured to think that the day might arrive when some highly successful executives would come to believe that there was something after all to the text of the Eighth and Ninth Commandments,[3] stating that in case the audience could not immediately place them by number that they were "Thou shalt not bear false witness against thy neighbor" and "Thou shalt not steal."

[3] (Protestants numbering, generally).

♦ ♦ ♦ ♦

The Boy Genius and the Mogul: The Untold Story of Television

By Daniel Stashower. Published 2002 by Broadway Books/Random House, www.randomhouse.com/broadway/, 6 1/4 by 9 1/4 inches, 277 pages, hardcover, $24.95.

Historians will be disappointed with this book. It lacks footnotes and contains only a two-page bibliography that lists mostly secondary sources. A short list of periodicals shows titles only. The book's subtitle is less than accurate and was probably added for sales appeal.

But Stashower is a good writer who tells a good story. Philo T. Farnsworth certainly counted as a boy genius—he independently conceived of electronic television as a high school boy of 14. And Sarnoff certainly counted as a mogul—-he forged RCA and then used it to forge the mid-century telecommunications world. Stashower's story of the professional struggles between these two men includes thumbnail sketches of Alexanderson, Armstrong, John Baird, De Forest, Elma Farnsworth, Gernsback, Charles Jenkins and Zworykin.

Competition, we are told, is good for us. Seldom is the caveat *up to a point!* added. The competition between Farnsworth and Sarnoff almost certainly elicited ruthlessness in Sarnoff ("I don't get ulcers; I give them.") and certainly had a deleterious effect on Farnsworth's health and fortune.

Sarnoff also liked to say "The Radio Corporation does not pay royalties, we collect them." In fact, Farnsworth was able to force RCA to pay royalties to him for his invention of the image dissector. But although Farnsworth won the patent battle he lost the television war. The book might be summed up by the Charles F. Jenkins quote which it contains: "It's the old story over again. The inventor gets the experience and the capitalist gets the invention."

Another view of the Farnsworth/Sarnoff fight is Evan Schwartz's *The Last Lone Inventor: a Tale of Genius, Deceit and the Birth of Television,* HarperCollins Publications, 2002, 322 pp., $24.95.

♦ ♦ ♦ ♦

Theremin: Ether Music and Espionage

By Albert Glinsky. Published 2000 by University of Illinois, www.press.uillinois.edu. 6 1/4 by 9 1/4 inches, 403 pages, $34.95.

For any of us who know that the frequency of an oscillator can be changed by varying the value of a capacitor and that one "plate" of a capacitor can be a human hand, the theremin cannot be magical or mysterious. Nevertheless the theremin, the only musical instrument that is played without touching it, captivated many people. These included Lenin, Einstein (Albert and Alfred), and thousands of others. Leon Theremin demonstrated his electronic musical instrument for Lenin in 1922; then he gave Lenin a lesson on the instrument by guiding his hands.

Glinsky's book saves Theremin from having the reputation of being a one-act inventor. He invented almost constantly during his long life (1896-1993). In 1927 he demonstrated his television system to Stalin. At the time this system was considerably advanced over that of Alexanderson at General Electric. (Theremin's television had a screen resolution of 100 lines and was capable of use in natural daylight. In 1926 he had demonstrated a television screen five feet square).

Though Stalin could see no educational or entertainment value to television, he immediately realized the spying potential of Theremin's machine and "appropriated" it for state use. Theremin was rewarded for his work with a government coupon for "a big food parcel."

Theremin spent much of the 1930s in the US,

demonstrating his musical instruments (and feeding corporate and industrial intelligence back to the Soviets). Shortly after he was "recalled" to the Soviet in 1938, he fell victim to one of Stalin's purges. He was found guilty of "treason to the Motherland" and sentenced to eight years' imprisonment in the infamous Kolyma camps in eastern Siberia. Most people sent there never returned, regardless of the length of sentence. They died mining gold under inhuman conditions, working in temperatures that could go to -94°.

Theremin was put on a cattle car with other prisoners for the 5,200 mile railroad trip to Vladivostok. There the prisoners were put aboard huge "slave" ships for the trip across the treacherous Okhotsk Sea. (Actually, Theremin was lucky just to get to Kolyma. It could have been otherwise. In 1936 the ship *Dzhurma*, on a similar journey, got stuck in autumn ice. When it finally arrived at its port that spring, none of the 12,000 prisoners in its hold were alive.)

Always the innovator, Theremin designed a system that improved the gold mining process at Kolyma. Fate soon intervened and he was recalled again to Moscow, there to help in the design of airplanes for use in WWII. Later he designed a resonance cavity transmitter that was hidden in a wall plaque in Averell Harriman's study in the American ambassador's house in Moscow. Still later Theremin was to have a kind of revenge on Stalin. He designed a miniature listening device that Soviet authorities hid in Stalin's desk.

For another view of Theremin's life and music machine, there is a video documentary produced by Steven M. Martin: *Theremin: An Electronic Odyssey*, MGM/UA Home Video, 1995, DVD, 84 minutes, $19.98.

To hear Theremin music in a venue other than 1950s sci-fi movie soundtracks, start with Clara Rockmore's *Art of the Theremin*, Delos Records # 1014, $11.98. This 1992 recording, now on CD, was co-produced by Robert Moog, of synthesizer fame. Of course, everyone's heard the theremin passages in the famous Beach Boys' song "Good Vibrations."

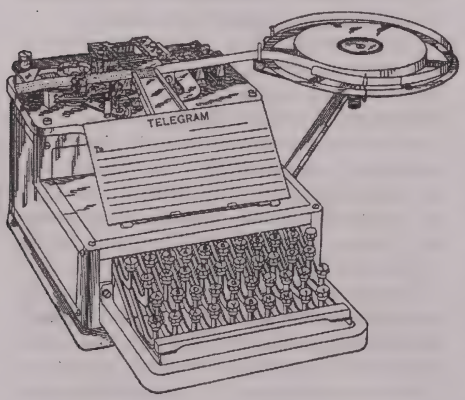
Glinsky's top-notch book got deserved rave reviews and won the ASCAP-Deems Taylor Award in 2001. The book, the video and the CD are all available through amazon.com. And if you really get bitten by the theremin bug, you can buy one, assembled or kit form, at Moog's website: www.bigbriar.com.

KEY AND TELEGRAPH, *continued from page 52*

ate a large number of messages beforehand on a perforator. This machine also looked like a typewriter, but produced a narrow punched tape. The tape was then fed into an automatic transmitter. The transmitter in both methods used a high speed polarity-changing relay called a pole changer.

The speed of the direct-entry method was limited by the typing abilities of the operator, whereas the automatic method could send messages at a consistent rate of nearly 100wpm. The receiving side had a very sensitive polar relay that drove a printer similar to a typewriter, printing out the messages directly on telegram blanks, ready for delivery. The receiving operator just had to feed new blanks for each incoming message.

The Barclay system worked successfully between New York and San Francisco using seven repeaters, but was typically used on circuits of less than a thousand miles. Barclay retired in 1910 at age 54. By 1914 twenty percent of Western Union's business was handled by printing telegraph systems, primarily the Barclay Printing Telegraph.



A perforator used with the Barclay Printing telegraph system.

SOURCES

Telegraph Age, December 1, 1902, August 1, 1903, November 1, 1903, January 1,1908
Annual Report to Stockholders, Western Union Telegraph Co., 1908 *Barclay Printing Telegraph System*, Western Union Engineering Paper, 1918
New York Times, August 25, 1934
Telegraph and Telephone Age, October 1, 1934
Western Union Technical Review, July 1958
U.S. Patents of John C. Barclay, 1903-1914

ARTHUR E. ZIMMERMAN, PH.D.

The First Wireless Time Signals to Ships at Sea

In 1907 the Dominion of Canada became the first country in the world to apply the infant wireless communications technology to a new purpose, a purpose which was a boon to navigation. That year the Marconi coastal station in Halifax began to broadcast an automated daily time signal by wireless telegraphy from the Canadian Meteorological Service to ships at sea, although the term "broadcast" had not yet been used in connection with wireless.

At the turn of the twentieth century, the pace of commerce and of everyday life was on the increase. The industrial world had entered the age of electricity, the age of automation and the beginning of a new efficiency of operation. Time was money and life was consequently more and more regulated and determined by the clock. It was becoming increasingly important to know the correct time.

Railways required accurate time, as did factories, surveyors, watchmakers and caretakers of public clocks. And the navigators of naval, merchant marine and cable ships needed a time fix for correct determination of longitude: the angle between the local meridian and the prime meridian at Greenwich.

Longitude is determined most accurately by the difference between local and Greenwich times. For example, noon local time, determined by observation of the sun or stars, is convertible into longitude with respect to the prime meridian at Greenwich; each hour difference from Greenwich represents 15 degrees of longitude. Ninety years ago most ships carried at least three chronometers with Greenwich reference time, while those requiring nicer navigation had more: a flagship kept five and a cable ship up to fifteen. Chronometers, however, may go off by seconds after a few weeks at sea, and at the equator, four seconds is a sea mile. The resulting faulty calculation of longitude could bring disaster.

The responsibility for maintaining and disseminating the correct time fell to the government. In Canada this was handled by the Meteorological Service of the Department of Marine and Fisheries.

Pre-Wireless Dissemination of Time Signals

Mean solar time is determined by observation of one or more "clock stars," whose positions with respect to the sun are known with great precision. These are observable day or night, if the sky is clear. Then, with the aid of the tables in a nautical almanac, the sidereal or star time can be used to determine mean solar time to within three to five tenths of a second. To get a more precise fix requires contact between observatories. Direct telegraphic connection by land line was too expensive and long-distance telephone too cumbersome, but by 1910 wireless telegraphy (W/T) offered a relatively inexpensive, instantaneous method of communication.

The Canadian Meteorological Service made its own observations of the standard stars at several locations for the fundamental determination of time. Using its Troughton and Simms meridian telescope, the Dominion Observatory at St. John, New Brunswick, maintained the master standard Riefler sidereal clock for the Maritime Provinces and disseminated the information as best it could. Until 1907, the Meteorological Service used three major methods to get this information instantaneously to the consumers of time data: visual, telephone and telegraph.

The St. John Observatory was connected by Western Union land telegraph lines to relay the 10 a.m. signal from its mean time transmitting clock to every Western Union office in the Maritimes. The signal was sent for the two minutes ending at 10.00 a.m. of the 60th meridian. A local telephone line in St. John carried the beats of a sounder connected to the transmitting clock, and from June 1903 there was also an official clock in the lobby of the St. John Post Office, connected by wire with a standard mean time Observatory clock and automatically synchronized every hour [1], [2].

514 BRUNSWICK AVE., TORONTO, ONTARIO, CANADA M5R2Z5, arthurz@look.ca

The St. John harbour had a tower with a falling ball device, a "time ball" with an electrical release, much like the New Year's Eve falling ball in Times Square, New York City. The falling ball signalled 1.00 p.m., 60th meridian time, every week day, based upon Observatory time.

An electric clock in the Western Union office in Halifax was one of those synchronized by wire every day with the St. John Observatory standard transmitting clock. In Halifax, a temporary "time ball" apparatus, put into service on October 1, 1904, was replaced by a new one of 16-oz. copper, 44 inches in diameter, based on the St. John design. This was inaugurated on August 1, 1908, the signal being sent automatically from the Halifax Western Union clock.

There were also systems of electric lights in harbours for night signalling, but that was largely for weather reports. Therefore, in order to receive the observatory's official time signals, a ship had to be within sight of certain harbours or else an officer had to get to the receiving end of a telegraph or telephone land line.

The wireless was an astounding revolution for the shipping business, an invaluable aid to navigation, a supplement to the fog signal service and a source of news and weather reports, revised sailing orders and commodity prices at different ports. Formerly, a ship out of sight of land or of passing vessels was beyond assistance. Marine disasters, even within a few miles of civilization, could go undetected and survivors often perished in lifeboats or on sandbars outside of the normal shipping lanes. Insurers such as Lloyd's of London invested heavily in wireless almost from the beginning to track their ship positions and arrivals. Six Marconi stations were operating under Dominion government contract in the river and gulf of St. Lawrence before the close of the navigation season in 1904 (Fame Point and Belle Isle, Quebec; Heath Point, Anticosti; Point Amour, Labrador; Cape Ray and Cape Race, Newfoundland), with three government steamers assisting in W/T distance testing [3].

Sable Island, the "Graveyard of the Atlantic," was linked into the Gulf system in the summer of 1905 [4]. The next logical use of W/T was to offer time signals to ships.

Wireless Time Signals

Daniel Leavitt Hutchinson [5] was appointed Director of the St. John Observatory in 1891. He replaced his father, George H. Hutchinson, who had been director since 1871 and responsible for meteorology and time since 1883. D.L. Hutchinson suggested in April 1905 that the new Marconi-owned and -operated wireless station being fitted out at Camperdown near Halifax be equipped with machinery to permit it to transmit the daily time signals from the Western Union lines to ships at sea [6], [7].

Robert Frederic Stupart, F.R.S.C. [8], Director of the Canadian Meteorological Service, Toronto, liked the scheme and recommended it to the Department [9]. Stupart wrote to Col. F. Gourdeau, Deputy Minister of Marine and Fisheries, Ottawa, on April 24 advising that since coast steamers in the Gulf were equipped with wireless, it would be useful for these ships to receive the 10 a.m. St. John time signal from proposed Marine and Fisheries wireless stations at Halifax, Amherst Island and Sable Island [10]. On April 11, 1906, Stupart informed Gourdeau that he wished to arrange for supplying the wireless stations with weather forecasts and for the Halifax station to begin transmitting a time signal to shipping [11]. After some delay, Stupart requested that Gourdeau instruct Mr. Cecil Doutre, Acting Accountant, Marine and Fisheries, Ottawa, "to arrange for the transmission of daily time signals by wireless telegraphy from Camperdown to Sable Island and ships at sea. Our daily time signals are sent over the Western Union Telegraph lines from St. John to Halifax and Camperdown can be included in the circuit" [12].

Stupart sent Hutchinson a cheque for the Vaughan Electric Company of Halifax on May 16, 1907, for installing Marconi apparatus [13]. By May 1907 an automatic key connected to the transmitting clock at St. John was sending the time signal instantaneously down the telegraph lines to the Camperdown station each weekday at 10 a.m., Atlantic time [7].

At St. John, "an automatic key...is thrown in circuit with the land line immediately before the time signal is received and out of circuit when the signal ceases." [7] In Halifax a special apparatus, operated automatically by Western Union wire, operated the key to transmit the signal. Thus, all of the relaying was automatic.

Mr. Hutchinson concluded in his 1907 report, "Thus the daily time signals from the transmitting clock at St. John will be available to ships at sea, equipped with the wireless apparatus, within the wireless zone of the above station." [14] He looked forward to improvements in wireless which would overcome local disturbances, and permit transmission to ships at sea all around the world to make impossible disasters through miscalculation of longitude [7].

Marine and Fisheries issued a "Notice to Mariners" in May 1907, stating:

The Meteorological Service of the Dominion of Canada is now sending time signals from the Observatory at St. John by telegraph to the Marconi Wireless Station at Camperdown, where special apparatus has been installed to automatically transmit the signal to ships at sea within the zone of that station.

Time signals will be sent each week day morning as follows: Beginning at 9h. 58m., a.m., Atlantic time, dots are made each second up to and including 9h. 58m. 57s., then a pause of two seconds, followed by a dot at 9h. 59m., then a pause of two seconds follows. The clock then makes dots each second up to and including 9h. 59m. 50s., a pause is then made, followed by a dot at 10h. a.m., Atlantic or Standard time of the 60th meridian west longitude, equivalent to 2h. p.m. Greenwich mean time. [7], [15]

The C.P.R. steamer R.M.S. *Empress of Ireland*, out of Liverpool with 1056 passengers and the English mails, bound for St. John via Halifax, reported reception of the very distinct 10 a.m. wireless time signal on April 23, 1908, while 160 miles southeast of Halifax. The Navigating Officer appreciated being able to check the ship's chronometers by wireless. [7], [16]

The first European wireless time signal for inter-observatory communication and ships in the Eastern Atlantic and Mediterranean was inaugurated in 1910, when the Bureau des Longitudes and the Paris Observatory arranged with the military wireless post at the Eiffel Tower to send out observatory time signals at night. A daytime service began soon afterward and, in Germany, the Norddeich wireless station began broadcasting time signals supplied by the Wilhelmshaven Observatory [17].

The best known daily wireless time signal, from the famous high-powered United States Navy station, NAA, at Arlington, Virginia, did not come on the air until February 1913. The Navy opened bids for equipment for NAA in 1909, specifying a year-round radius of reception of 3,000 miles. The contract was won by the National Electric Signalling Company, Reginald Aubrey Fessenden's firm, which supplied a 100-kW synchronous rotary spark transmitting set [18].

It is interesting to note that the Year Book of Wireless Telegraphy and Telephony did not mention the Canadian time-signal operation until 1919, after the Great War, when it commented, "A Time Signal is sent out by the Camperdown Station daily at 2 pm (G.M.T.) on a wavelength of 600 metres." [19]

The last of the time balls disappeared by the early 1930s and the fundamental determination of time in Canada was abandoned after 1931, except at St. John, in favour of radio time signals from Ottawa or Washington. The St. John Observatory continued to send automatic signals down the Canadian Pacific Railway land lines to radio transmitter VCS, Camperdown, seaward from Halifax harbour, as late as 1936 [20] and to VAV, the Marine and Fisheries coastal station near Halifax at Chebucto Head.

That year, however, the Dominion Observatory in Ottawa became responsible for correct time and the Meteorological Service was no longer concerned with the task [20]. The St. John Observatory remained active because of public pressure and its network of time circuits remained operational until 1949 [21].

The author is grateful to Morley K. Thomas of the History of Canadian Meteorological Project, Atmospheric Environment Service, Downsview, Ontario, for access to the archival letters of the Canadian Meteorological Service.

NOTE: This story is an amplification of material in the author's book In the Shadow of the Shield. The Development of Wireless Telegraphy and Radio Broadcasting in Kingston and at Queen's University: An Oral and Documentary History, 1902-1957 *Self-published, 1991; 657 pages, fully referenced, illustrated, hard cover. Purchase directly from the author; cost, including shipping, in Canada is $34.45 (Can.); in US $25.00 (US); elsewhere, inquire.*

REFERENCES

1. D.L. Hutchinson, "Meteorological Report: Appendix A," October 31, 1904; *Department of Marine and Fisheries, Sessional Paper of the House of Commons, Ottawa*, No. 21, Vol. 39 #9, page 85, 4-5 Edward VII, 1905.
2. D.L. Hutchinson, "Meteorological Report, Appendix A," September 1906; *Department of Marine and Fisheries, Sessional Papers of the House of Commons, Ottawa*, No. 21, Vol. 41 #9, page 85, 6-7 Edward VII, 1906-07.
3. O.G.V. Spain, Appendix No. 11 "Marconi Wireless Telegraph System," *Department of Marine and Fisheries, Sessional Papers of the House of Commons, Ottawa*, No. 21, Vol. 41 #9, page 114, 4-5 Edward VII, A. 1905.
4. O.G.V. Spain, Appendix No. 6 "Wireless Telegraphy Marconi Stations," *Department of Marine and Fisheries, Sessional Papers*

of the House of Commons, Ottawa, No. 21, Vol. 40 #9, page 118, 5-6 Edward VII, A. 1906.

5. Daniel Leavitt Hutchinson, born 1855; Obituary, *New York Times*, Dec. 7, 1927, page 29; "Deaths," *The Telegraph Journal*, Saint John, New Brunswick Dec. 7, 1927, page. 5.
6. D.L. Hutchinson to R.F. Stupart; file #6730, date of letter inward April 22, 1905; Register book 1904E, letters sent and received by R.F. Stupart; Atmospheric Environment Service Archives, Downsview, Ontario. NOTE: No incoming letters to R.F. Stupart exist. They were destroyed circa 1971, but the registry of incoming letters does survive. Onion skin copies of Stupart's responses and letters to the Department of Marine and Fisheries survive. (Personal communication from Morley K. Thomas, History of Canadian Meteorology Project, October 19, 1990.)
7. D.L. Hutchinson, "Wireless Time Signals from the St. John Observatory of the Canadian Meteorological Service," *Proceedings and Transactions of the Royal Society of Canada*, Section III, 3rd Series Vol. 2, page 153, 1908. The Camperdown station at the entrance to Halifax Harbour, was owned and operated by the Marconi Wireless Telegraph Company of Canada, Ltd., and had a range of 250 nautical miles. Its call signal, VCS, was not listed by the Radiotelegraph Branch, Department of the Naval Service until the 1914 report: *Department of the Naval Service, Sessional Papers of the House of Commons, Ottawa*, No. 38, Vol. 50 #26, page 72, 5 George V, 1915.
8. "Sir Frederic Stupart (1857-1940)," *Proceedings and Transactions of the Royal Society of Canada*, series Vol. 35 Appendix B, 1941.
9. R.F. Stupart to D.L. Hutchinson, April 24, 1905; Letter book 1905C of R.F. Stupart (Vol. 39): General Letters, April 11 to December 7, 1905; page 45; *Atmospheric Environment Service Archives*, Downsview, Ontario.
10. R.F. Stupart to F. Gourdeau, April 24, 1905; Letter book 1904B of R.F. Stupart, Departmental Letters, April 26, 1904 to May 19, 1906, p. 413; *Atmospheric Environmental Service Archives*, Downsview, Ontario.
11. R.F. Stupart to F. Gourdeau, April 11, 1906; Letter book 1904B of R.F. Stupart, Departmental Letters, April 26, 1904 to May 19, 1906, p. 903; *Atmospheric Environmental Service Archives*, Downsview, Ontario.
12. R.F. Stupart to F. Gourdeau, February 2, 1907; Letter book 1906C of R.F. Stupart, Departmental Letters May 21, 1906 to July 24, 1908, p. 376; *Atmospheric Environmental Service Archives*, Downsview, Ontario. NOTE: By late 1907, Mr. Doutre was Superintendent, Government Wireless Stations.
13. R.F. Stupart to D.L. Hutchinson, May 16, 1907; ibid., p. 862.
14. "Report of the Department of Marine and Fisheries: Meteorological Report," Appendix 9A, *Department of Marine and Fisheries, Sessional Papers of the House of Commons, Ottawa*, Paper No. 21, Vol. 42 #10, page 107, 7-8 Edward VII, 1908.
15. *Notice to Mariners, No. 42 of 1907 (Atlantic Notice No. 25)*, Halifax Harbour - Camperdown - "Time Signals," *The Canada Gazette*, Vol. XI #50, Ottawa, Saturday, June 15, 1907.
16. "Empress of Ireland," *Halifax Herald*, April 23, 1908, page 9; "News of the City," ibid., page 10.
17. Arthur R. Hinks, "Wireless Time Signals," in *Year Book of Wireless Telegraphy and Telephony*, published for the Marconi Press Agency, Ltd., by the St. Catherine Press, London, 1913, page 297.
18. Hugh G.J. Aitken, "The Continuous Wave: Technology and American Radio, 1900-1932," Princeton University Press, Princeton, New Jersey, 1985, page 87.
19. Year Book of Wireless Telegraphy and Telephony, Year Book Publications, London, 1919, page 978.
20. Personal communication from Morley K. Thomas, October 2, 1990.
21. Malcolm Thomson, *The Beginning of the Long Dash: A History of Time Keeping in Canada*, University of Toronto Press, 1978; page 54.

BY BILL FIZETTE, W2DGB

A Structured Approach To Fixing up Those Nice Old Radios

10—Restoration of a Meissner 8-Tube "Combination" Kit Receiver

PART 2 — MAKING THE REPAIR

Parts Issues

It is a good idea to locate all the needed parts and information before you start any of the actual electrical work on a restoration. The usual variety of capacitors, resistors, and tubes are available through a number of sources, including mail order or old radio flea markets at the various meets and conferences. Special parts such as dynamic speakers with specialized field coils, replacement dial drives, special volume controls, or unique combinations of electrolytic capacitors may be harder to find. In some cases you will have to repair or improvise. The Internet is one of the best location tools available, and a good library is invaluable.

Getting the correct knobs can be particularly troublesome, and in some cases downright expensive. A case in point is finding the knobs needed to complete a Zenith restoration. Originals are very hard to find, and even replicas are pricey. In the case of our Meissner, we needed six small matched black period knobs, and a larger one for the tuning control. I finally found some, and while the appearance is acceptable, they are not the original design.

I use disk ceramics for most by-pass applications. Audio, larger value AVC, and coupling capacitors are usually tubular. Replacement electrolytic filter capacitors are the new small cartridge type with axial leads, usually 22 mfd at 450 V. These work well for almost all applications.

If the original cans were mounted above the chassis, simply clip the leads, leave them in place for appearance, and wire in the new parts underneath. For the Meissner I replaced the three above-chassis electrolytics with a good multisection can type mounted on home-made standoffs below the chassis.

A note regarding replacing electrolytics is in order. Examine the diagram carefully to determine where the negative returns are wired into the circuit. While some go directly to ground, many period circuits derived the bias voltages from the negative leads, and in those cases, multisection cans having the can as a common ground cannot be used. You will have to use individual cartridges.

A new line cord is almost always needed. While using the newer style having a ground post is a good idea for safety reasons (except on AC-DC sets, where a ground connection to the chassis will result in disaster), I often use the older two-prong style for small receivers with relatively low power requirements.

If your circuit uses a power transformer, look it over carefully for signs of burning, melted tar, and that sort of thing. Run continuity checks on the windings. If you are lucky, the transformer will be still good. If not, replacements can be purchased, but they are quite expensive. A less expensive way would be to try to adapt a junk-box transformer to your set.

Books could be written about acquiring and adapting replacement parts for old radios, or repairing original parts, so these few paragraphs are just a brief sampling. I may take up the subject again in a later column.

Matching Up A Speaker

The Meissner set was set up to use an external speaker, and this was missing. Finding the correct speaker for a radio from the '30s or early '40s can be a real problem. Most of these sets used a "hot field" design, in which the field coil to excite the magnet doubled as a filter choke. If you are lucky, you will find one with the correct field resistance that will actually work. Most of the ones I locate that have a good field are either of the

RR 1, BOX55, HENRYVILLE, PA 18332, e-mail w2dgb@enter.net

wrong value or have severe distortion. One way out of the dilemma is to have the speaker rebuilt by folks who specialize in that kind of thing. Another approach is to use a good modern PM type (field is supplied by a permanent magnet so there is no field coil). To serve as a choke in lieu of the field coil, install either a series of chokes, or a choke and additional power resistors, adding up to the required DC resistance.

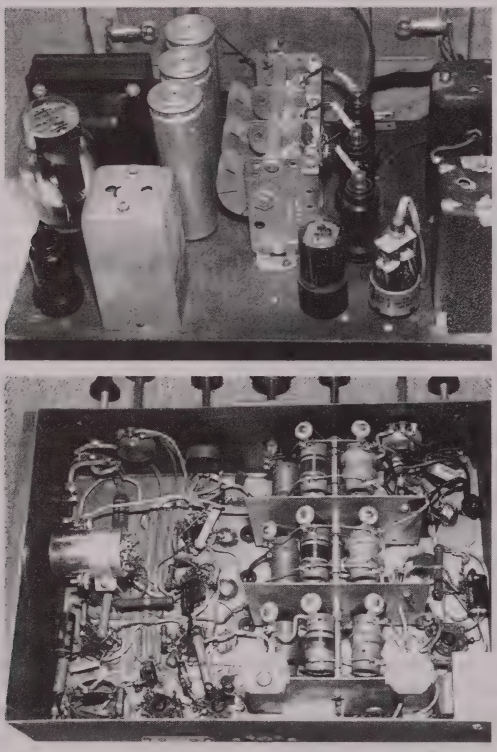
In this case, I needed a 1500 to 2000 ohm field coil, and I used a 300-ohm choke in series with several 20-watt resistors having the required added resistance to give the correct power-supply output voltage. The diagram showed a 105VDC drop in the original field, some ten watts, with the output voltage listed at 260VDC. Be sure to check the output voltage carefully, as modern line voltages are somewhat higher than when the radio was built, and you seldom need more than 250VDC on the B+ buss.

Incidentally, most of those old radios had the output transformer mounted at the speaker, in contrast to present-day practice. I have an old multitap output transformer that I switch clip leads around on until the audio sounds acceptable. Then I search for another fixed transformer that gives about the same results, and install that.

Installing Replacement Parts

I have emphasized this in the past and I repeat it here; if possible test all components before you install them. Resistors should be within 20% of the marked or coded value. Capacitors preferably should be checked with a capacitor tester for both marked value and test voltage. Electrolytic capacitors, if they have been sitting in a drawer for a time, should be "reformed."

It is a good idea to replace one item at a time to avoid confusion and the risk of installing a part incorrectly. An easy way, recommended by many restorers, is to snip the lead wires of the old part near the body, leaving leads already in place to connect to the new part. You can either hook the wires together, or butt joint them inside a spiral sleeve of fine wire before soldering.



Chassis top and bottom views of repaired Meissner receiver. The three power-supply filter capacitors seen next to the power transformer above the chassis were disconnected, left in place for looks, and replaced with modern units mounted underneath.

You may run into a problem with degraded (rotted) rubber insulation on hookup wiring under a chassis. This is common in '30s Philco radios, and is a chore to repair. One way is to replace each bad wire with a new piece; another is to snip one end and slide a piece of spaghetti over the wire, then reconnect.

With the Meissner, I had to replace 14 capacitors, six electrolytics, and four resistors. The good state of the old "dog-bone" resistors was a pleasant surprise; apparently the radio had been stored in a dry place over the years after it stopped working. I also needed three tubes, but these were all standard and not a problem.

You will frequently run into the situation where you have to replace a dial cord, as I did with this set. The job can range from the easy to the near impossible. I can only suggest that you go slowly, and make a sketch before you remove the old pieces. Rider's Manuals information on a set often will show the way to string a replacement. Medical forceps are a big help.

Final Check and Applying Power

Before you stick the plug into a wall outlet, it is suggested that you check the B+ bus-

(continued on page 68)

EDITED BY **FRANK LOTITO, K3DZ**, 1428 O'BLOCK RD., PITTSBURGH, PA 15239
PLEASE INCLUDE SASE FOR REPLY.

The Decremeter and Grid Dip Oscillator: VLF Through UHF

Part 1—Basic Resonant Circuit Theory

Forty or fifty years ago, the Grid Dip Oscillator was a "must have" device for a reasonably equipped amateur radio shack. Roll the calendar back another half-century, and the "must have" of the era was a predecessor instrument: the Decremeter. Before discussing the Decremeter and GDO and their applications, we must have a conversational familiarity of basic resonant circuit theory.

The basic theory applies to primitive VLF and LF radio receivers, transmitters and antenna systems as well as modern day UHF equipment. We'll review it in this article and give both historic and modern examples of resonant radio circuits. In Part 2 of the article, to be presented in a future column, we'll discuss the operation, application, and limitations of both instruments.

Electrical resonance is defined as a condition where an LC circuit behaves as a pure resistance. As we will see, this pure resistance is not the resistance indicated by an ohmmeter. Three types of resonant circuits will be discussed, series, parallel, and coupled. These circuits form the foundation of a wide range in circuit designs ranging from historical through modern day equipment.

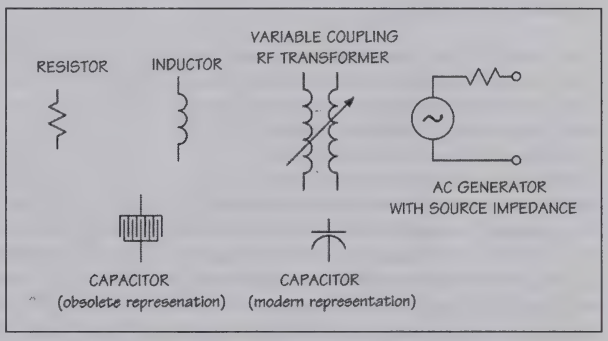


Fig. 1. The Five Basic Ideal Components

The Model

Since the earliest days of radio we have modeled electronic circuits using *ideal circuit components*. The model treats the five basic resonant circuit components: resistor, capacitor, inductor, transformer, and voltage generator as current and frequency independent entities. This approach is used by most undergraduate courses on circuit design theory. Such a model will be more than adequate to give us a conversational understanding of resonant circuit behavior.

Examination of the behavior of a resonant circuit using *real components* previously required some very time-consuming mathematical manipulations. However, development of the affordable PC allowed designers to extend the model to include real components. Circuit analysis software such as Pspice [1] take the burden out of performing the mathematics required to analyze complex circuit designs.

Whether discussing ideal or real components, we draw the model in a diagrammatic form called a *schematic*. The representations of the individual basic components have changed little in the past 80-plus years. Figure 1 illustrates the five basic ideal components of most interest to us.

The alternating current through the resistor, capacitor, and inductor is directly proportional to the alternating voltage across the component. For example, when you double the voltage, the current doubles. The voltage source's output is very load-dependent. The idealized voltage source model includes a series resistance that represents the "source impedance" of the generator. Demand more current and the voltage drops at the generator terminals. Lower the demand for current and the voltage rises at the generator's terminals.

For the ideal resistor, capacitor, inductor and

voltage source, the "value" remains constant as frequency increases. In other words, a 100 ohm resistor is 100 ohms at DC through a zillion Gigahertz. A 10 volt generator (without a load) is 10 volts at DC through a zillion Gigahertz. Inductance and capacitance also remain constant as frequency changes, but inductors and capacitors also have *reactance*—which opposes current flow in a manner dependant on frequency. Double the frequency and inductive reactance doubles, while the capacitive reactance halves. The reactance equations are:

$$X_L = 2\pi fL$$

Where L is in henries, f is in hertz, and X_L is the inductive reactance in ohms

$$X_C = 1 + (2\pi fC)$$

Where C is in farads, f is in hertz, and X_C is the capacitive reactance in ohms

An important point to remember is that resistance, reactance, voltage, and current are vectors. That is they have both magnitude and *direction*. Inductive and capacitive reactance are opposite in direction. More on this concept later.

The transformer is the most difficult component to understand. The secondary winding is "magnetically" coupled to the primary winding. If a magnetic core is used, i.e., iron sheets as used in power line transformers, or ferrite as used in modern day balun transformers, the coupling between primary and secondary coils is very *tight*. For tight-coupled transformers, the conventional power transformer relationships hold:

$$(N_p)(V_s) = (N_s)(V_p)$$

$$(V_p)(I_p) = (V_s)(I_s)$$

Where N_p and N_s are the number of primary and secondary turns
V_p and V_s are the primary and secondary voltages
I_p and I_s are the primary and secondary currents

If no core material is used, or one or both of the windings is spaced away from the core material, the transformer coupling is called *loose*. Then the traditional power transformer relationships shown above are no longer valid. Two examples of loose-coupled transformers are:

(a) A secondary coil of one or more turns inserted between the center-tap turns of an air-core tank coil (as used for an OT "1929 type" Hartley oscillator breadboard transmitter)
(b) The secondary winding as used on the "oscillation coil" of a spark transmitter.

Series, Parallel and Coupled Circuits

In order to conversationally understand resonance we must gain a basic understanding of series, parallel, and coupled circuits. Figure 2 il-

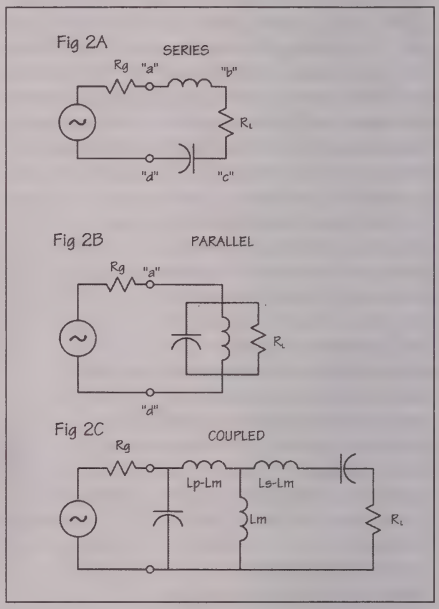


Fig. 2. Resonant Circuits

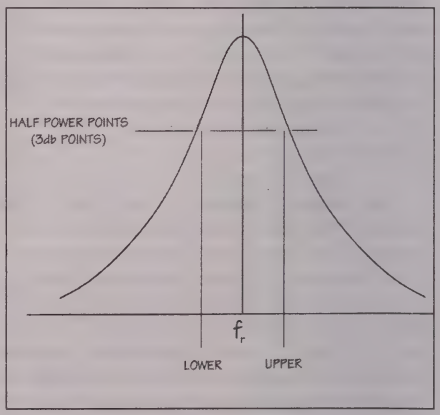


Fig. 3. Current in a Series Resonant Circuit

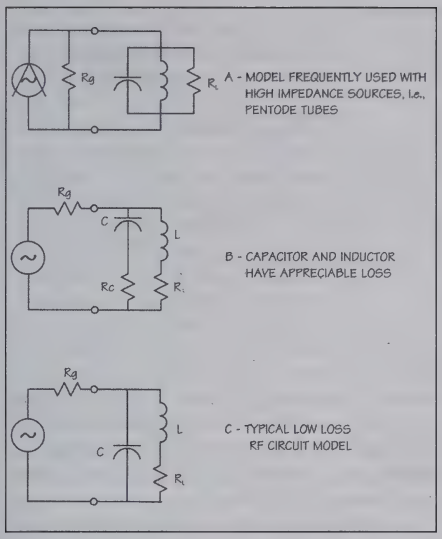


Fig. 4. Parallel Resonant Circuits

lustrates the circuit models for these circuits.

Consider the series circuit of Figure 2A. If we were to hop onto an electron exiting the top side of the alternating current (or RF) generator at point "a," we would see the electron first flow through the inductor from point "a" to "b." The electron then flows through the resistor from point "b" to point "c," and finally through the capacitor from point "c" to exit at point "d" and back into the generator's low side. For ideal component modeling purposes the interconnecting wires have no resistance and no reactance.

Next, consider the parallel circuit of Figure 2B. This circuit gives an electron the opportunity to choose a path as it exits point "a" on its way to "d." Most electrons will favor the path of least resistance or least reactance. If, for example, the value of the inductive reactance is the lowest, and the value of the resistance is the second lowest, the lowest electron flow will be through the capacitive path. The highest electron flow will be through the inductance.

Figure 2C illustrates the transformer modeled as a "T" circuit (section 14-14, ref [3]). L_M models the inductive coupling between the primary coil L_P and secondary coil L_S. *If the coupling is tight*, L_M has a *high* inductance. *If the coupling is loose*, L_M has a *low* inductance. You can now visualize that the transformer model is actually a combination of a parallel and series circuit. Tight coupling, large L_M, means a higher current is available at the secondary side, and visa-versa. However, there is always a current flow through the secondary coil L_S regardless of how loose the coupling.

We are now ready to discuss the resonant circuit theory using this basic information.

Series Resonance

Consider the resonant circuit of Figure 2A. As frequency is increased, the capacitive reactance decreases, the inductive reactance increases, and the resistor value and generator voltage remain constant. Eventually, we will reach a frequency where the inductive and capacitive reactances *cancel each other*. This frequency is given by the familiar formula:

$$f = 1/2\pi\,(LC)^{1/2}$$

Where *F is the frequency in hertz*
L is the inductance in henries
C is the capacitance in farads

or using pre-WWI technology:

$$\lambda = 38\,(LC)^{1/2}$$

Where λ *is the wavelength in meters*
L is the inductance in centimeters
C is the capacitance in farads.

The first equation was commonly used from the 1930s to the present. The second equation is the most popular form used prior to the 1930s. Note the units. Both equations are technically correct and identical *so long as the proper units are used.*

The value R_g in Figure 2A is actually the sum total of four *ideal* resistances. These resistances are:

(a) the ideal generator output resistance
(b the inductor's equivalent losses modeled as a single pure resistor
(c) the capacitor's equivalent losses modeled as a single pure resistor
(d) the part of the load which is purely resistive.

If the load is reactive, i.e. behaves as a resistor in series with an inductor, or resistor in series with a capacitor, the load's resistance becomes part of R, and the load's inductance or capacitance part of L or C. The rules for adding R, L, and C in a series circuit are:

(a) for total resistance, numerically add the individual resistances
(b) for total inductance, numerically add the in-

dividual inductances

(c) the reciprocal of the total capacitance is the sum of the reciprocals of the individual capacitances

A very important descriptor for resonant circuits is the *bandwidth*. If we measure the current flowing in a series circuit as frequency is slowly swept from some low frequency (long wave length) to a higher frequency (shorter wave length), we see a bell-shaped curve (Note: this is not a "normal distribution" curve in the statistical sense). The current peaks when resonance is reached.

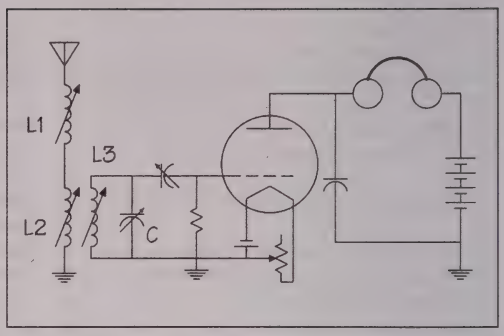


Fig. 7. 3-Element Valve Detector

It has been customary to define the bandwidth of the series circuit as the difference in frequencies that represent the "half power points" (f_{upper} - f_{lower}). The half power point is the point at which the current in the series circuit drops to 70.7% (-3dB) of the current at the resonant frequency, as shown in Figure 3. The bandwidth, f_{upper} - f_{lower} of the series resonant circuit may be calculated from the expression f_r/Q, where Q is the inductive reactance, $2\pi fL$, divided by the total series circuit resistance.

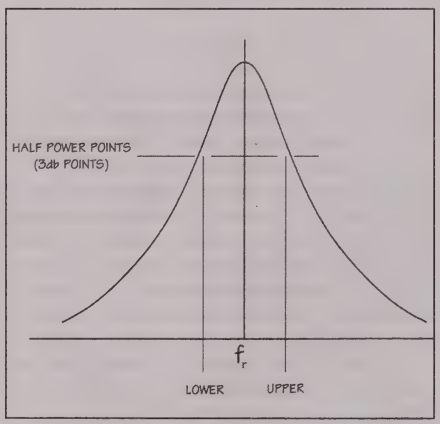


Fig. 5. Voltage Across the Total Resonant Circuit

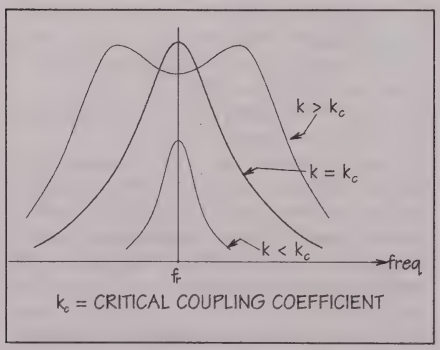


Fig. 6. Tuned Coupling Circuit Response vs, Coupling Coefficient

At a frequency *below* resonant frequency f_r, the capacitive reactance of the circuit is high in value, and the inductive reactance is low in value. The circuit takes on the behavior of a resistor in series with a capacitor. (In a series circuit you can numerically add the inductive and capacitive reactances. Make sure you treat capacitive reactance as a negative value, and inductive reactance as a positive value.)

At a frequency *above* the resonant frequency, f_r, the inductive reactance of the circuit increases, and the capacitive reactance decreases. The circuit takes on the behavior of a resistor in series with an inductor.

Parallel Resonance

Figures 4A through 4C illustrate three models of a parallel resonant circuit. Figure 4C is most often used in the older literature to model "radio frequency" parallel circuits. Parallel circuit resonance is more complicated than series circuit resonance. We will take a few items on good faith in order not to get bogged down in mathematics. The formula for resonance is:

$$f = [1/2\pi(LC)^{1/2}] [1\text{-}CR_L^2/L]^{1/2}$$

Tune up your 1929 Hartley breadboard with no load on its output. Now connect a dummy load to the output. You will find out the oscillator's frequency shifts down. The above formula is part of the reason why. This is definitely not the simple formula we learned when we studied for our amateur radio licenses.

As frequency is varied from some low value, the parallel inductor-series resistance path starts

at a "combined reactance" of the resistance plus inductive reactance. The capacitive path has a very high reactance.

Put a high reactance in parallel with a low reactance and the electron flow will favor the low reactance path. In this case the resulting circuit looks like a resistance in series with an inductor. At resonance, the circuit behaves like a pure resistance whose value is approximately L + RC. The units of L and C are the customary henry and farad. This is the RF, or alternating current reactance. Increase frequency above resonance, the inductive reactance increases, while the capacitive reactance decreases. The resulting circuit looks like a resistor in series with a capacitor. Now things really start to get complicated. In the parallel resonance equation above, R represents the DC plus RF losses of the inductor L, plus the load resistance transposed to the inductive path. Let's not worry how that is done. However, the tighter we couple the load into this circuit, the larger R becomes. The mathematically astute reader will see the as R becomes larger, the value within the square root brackets decreases—first to zero and then to a negative quantity. In practical terms, this means that parallel resonance *cannot be achieved* if the value R is too large. One last point concerns the bandwidth or selectivity of the parallel circuit. Using the parallel resonant circuit of Figure 4C, the sharpness of tuning can be examined. As with the series circuit, bandwidth is determined at the 70.7% points. However, for a parallel circuit, the 70.7% point is where the current through C (or the series combination of L and RL) is 70.7% of the current at resonance.

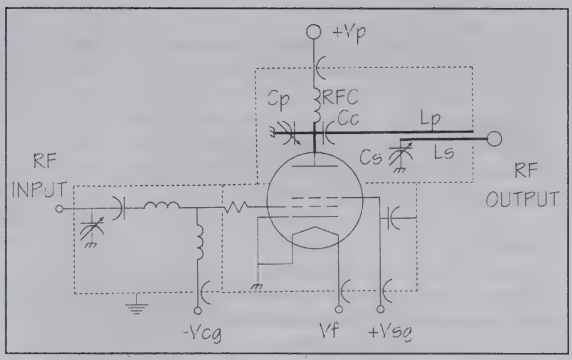


Fig. 8. DK1OF 2-Meter Amplifier

The equations tell us if you want to improve selectivity, that is make $f_2 - f_1$ smaller, you must decrease the ratio of X_l to R_g by increasing R_g and/or increasing the coil Q, i.e., decreasing R_L. The bandwidth relationship is:

$$f_2 - f_1/f_r = 1/Q_{coil} + X_L/R_g$$

and the voltage across the total resonant circuit is shown in Figure 5.

Coupled Circuits

Hang on, we are now going to cover dozens of pages of theory in a few paragraphs and figures! Refer back to Figure 2C, the transformer at radio frequency. We use a circuit of this type to match the generator (source) impedance to the load impedance. After the theoretician has "turned the crank" on the circuit's equations, we learn that the term "coefficient of coupling" is a function of the primary and secondary inductances, and the mutual inductance between the primary and secondary, L_P , L_S , and M respectively:

$$k = M/(L_P L_S)^{1/2}$$

Theory tells us the frequency response curve may take on one of three general shapes, Figure 6. The shapes are determined by the coefficient of coupling, k. Note the middle curve (bold line) where $k = k_C$. The term k_C designates critical coupling. If $k < k_C$, the condition is called "light," "loose," or "under coupled." Light coupling is realized when the secondary coil is backed away or unmeshed from the primary coil. The voltage across the total resonant circuit, as frequency is varied, is narrowly peaked about the resonant frequency f_R. At the resonant frequency, the loose-coupled impedance seen by the generator is a pure resistance.

As we mesh the secondary coil most all the way into the primary coil we see a double-peaked output response on either side of f_R. This represents a condition called "tight" or "over coupled" coupling, $k > k_C$. There are two resonant peaks that appear resistive. The separation between the peaks increases by increasing the coefficient of coupling. The relative height of each peak is a function of the Q and resonant frequency of the primary and secondary circuits.

Last, if we back the secondary coil away from the primary coil, we reach a point where the last sign of a "double peaked response" disappears. This is the "critical" coupled condition, $k = k_C$.

Now for the $64 question, "How do I know if I am under coupled, over coupled or critically coupled?" That will be answered in Part 2 of this

article. Another $64 question, "Is there an equation that relates the mechanical dimensions between two coils to the mutual inductance or coefficient of coupling?" Not really. You can develop a relationship for a specific mechanical design, but the relationship will rapidly lose accuracy if the mechanical design deviates too far from the base design used to develop the relationship.

Examples

Figures 7 and 8 are examples of the "old" and "new" applications of the above discussions. Figure 7 is a one-tube "three element" detector receiver [2]. This receiver is one step above a crystal detector or simple Fleming Valve (vacuum diode) detector receiver. The detector is the tube's grid-filament, with the grid-plate circuit providing amplification of the detected signal. Notice the transformer formed by the coils L2 and L3 and the parallel resonant circuit formed by L3 and C2.

Do you see the series resonant circuit? Sure enough, it's there — hint, antenna, L1 and L2. In order for this receiver to work efficiently, the antenna is (usually) cut for less than a quarter wave at the highest desired frequency to be received. The "short" antenna appears to look like a resistor in series with a capacitor. The antenna circuit is brought into series resonance by resonating the antenna capacitance with L1 and L2.

Figure 8 is a "modern" 2-meter power amplifier designed by DK1OF [4]. The tube is a 4CX250B ceramic power tetrode. Can you see the parallel and series tuned circuits and the transformer-coupled circuit? Look carefully!

The inductor L_p is a strip line inductor made from a short-circuited, less than quarter wavelength, piece of 1" hard copper tubing. The tubing is grounded on its far side to the inside of the plate circuit enclosure. The capacitor C_c is a DC blocking capacitor used to keep the 2000 VDC plate voltage off the inductor. The variable capacitor C_p is in parallel with L_p, and tunes the tube's plate circuit primary to the correct frequency range on the 2-meter band.

The "transformer secondary" is L_s, made from a piece of 15mm by 78mm by 1/2mm thick copper sheet. The variable capacitor C_s series-tunes the secondary circuit of the transformer. Coupling between the primary and secondary "coils" is done by spacing the 15 by 78 mm copper strip from the ground end of L_p . For this design, the starting point is about 5mm. After assembly, a little bending of L_s towards or away from L_p effectively changes the coupling.

You can see from Figures 10 and 11 that these are timeless circuits applicable to any era in the history of tube type radio, and to any frequency between VLF through UHF. Definitely, Figure 10 can be scaled for the 160 meter amateur band. However, very few of us can accommodate an 80-inch diameter pipe about 61½ feet long in our shacks! It would be far easier to wind the traditional solenoid type #12 or #10 AWG copper wire coils on appropriate cylindrical forms. (So much for complaining about the physical size of OT 160 meter coils!)

See you next issue for Part 2, the Decremeter and GDO, VLF through UHF!

References

[1] "Pspice," see http://www.orcad.com

[2] Elmer E. Bucher, *Practical Wireless Telephony*, The Wireless Press, NY, NY, May 1918 edition, page 159, figure 179.

[3] K. Y. Tang, *Alternating-Current Circuits*, International Text Book Co., Scranton, PA, third edition, 1960.

[4] *Radio Communications Handbook*, The RSGB, Potters Bar, Herts, UK, sixth edition, 1994, figure 8.102, page 8.50.

A STRUCTURED APPROACH, *continued from page 62*

to-ground resistance. It should be several thousand ohms. If it is not, you have a short that will have to be cleared. I also usually leave the rectifier tube out of the socket, and check the AC voltage from the transformer to each plate. Further, when I do plug the set in to the AC mains, I bring the voltage up slowly with a Variac, watching the dial lights and tube filaments if I can see them.

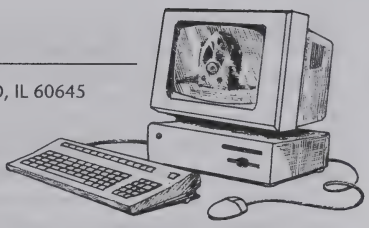
If all is well, I will then install the rectifier tube, clip my meter leads across the B+ line to ground, and again bring the applied voltage up slowly with the Variac. At some point the rectifier will begin conducting, and you will see B+ appear on your meter. The final reading should be about what your diagram says. If it is significantly lower, turn the set off immediately. You have a problem that will have to be solved.

Alignment

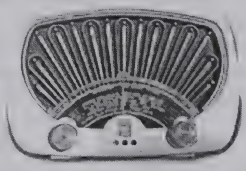
This is another subject that will take a large amount of space. Briefly, align the IFs first, and then

ON THE INTERNET

EDITED BY **CHUCK SCHWARK**, 7454 N. CAMPBELL AVE., CHICAGO, IL 60645
PLEASE INCLUDE SASE FOR REPLY. E-MAIL: caschwark@aol.com



Foreign Radios on the Web



The word "foreign" is certainly relative. Our AWA membership includes not only US collectors and restorers, but also many individuals from European and Asian countries. Some of our US enthusiasts collect and restore foreign radios like Saba, Orjonikidze, Tokuhisa, Grundig, and Pye. On the other hand, there are Europeans and Asians who and restore "foreign" sets with strange sounding names like Jackson-Bell, Freed-Eisemann, Magnavox, Crosley and Zenith.

Here is just a very short list of some of the many sites out there dealing with radios that many seen foreign to us, but are right at home in other parts of the globe.

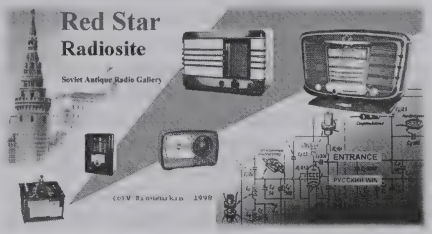
Classic Radio Gallery by Merrill L. Mabbs
http://classicradiogallery.com/
This site has many foreign sections well worth browsing!

Worldwide Vintage Wireless Database by David Martin Francis
http://www.classaxe.com/wireless/data/
A very good representation of British valve sets, history and information.

Wumpus's Old Radio World by Rainer Steinfuehr
http://home.snafu.de/wumpus/
German wireless history, photos, technical information and much, much more…

Red Star Radiosite by Vitaly Brousnikin
http://oldradio.onego.ru/index.html
A very nice and well designed Soviet antique radio gallery. A large range of Russian sets is represented—great photos and info.

Antique Japanese Radios by Koji Hayashi
http://radiomann.hoops.ne.jp/AJR.html
Although this site is by a Japanese collector, there is enough English text on the site to navigate and view the great pictures of tube-type radios both pre and post-war.



A STRUCTURED APPROACH, *continued*

do the RF sections in the order indicated. Keep the signal generator level low to avoid swamping the various stages. You should not have to do much at all as most radios will hold their approximate alignment for years if they have not been mistreated. That was the case with the Meissner receiver.

And Finally…

Someday I may get lucky and located a matching Meissner cabinet, and perhaps, a matching dynamic speaker. In the meantime, we have a colorful 1938 radio that plays and does not look bad at all. You will note that I have avoided cabinet repair and other cosmetic work. Past columns have touched on the subject, and I prefer to leave it there. Perhaps some hardy reader will volunteer a guest column. Anyone?

Recent Radio, TV and Entertainer Obituaries

COMPILED BY **CHARLES S. GRIFFEN W1GYR**
1225 NEW BRITAIN AVE., WEST HARTFORD, CT 06110-2405

Note: When known, the date of death is indicated in parenthesis.

GEORGE JAMES ARKEDIS, 88, (12-20-01) retired Vice President and General Manager of the CBS Radio Network. Arkedis began his broadcasting career in a sales position with WABC(AM) (now WCBS) in New York City at the end of WWII. Later he joined the CBS Television Network as an account executive and advanced to become Midwest Sales Manager. In 1953 Arkedis was named General Sales Manager for CBS-owned WBBM (TV) in Chicago. Eleven years later he was appointed VP of Sales and Affiliate Relations for CBS Radio and relocated to New York City. In 1966 Arkedis was named VP and General Manager. He retired from CBS in 1978.

DEE BARTON, 64, (12-4-01) musician and composer. Barton was the former trombonist, drummer and arranger for the Stan Kenton Orchestra. His compositions, *Waltz of the Prophets* and *Turtle Talk*, were on Kenton's 1961 Grammy-Award-winning album *Adventures in Jazz*. In the late 1960s Clint Eastwood commissioned Barton to write scores for his movies *Play Misty for Me, High Plains Drifter* and *Thunderbolt and Lightfoot*. In addition, he wrote music for more than 50 films and for television shows such as *Rockford Files, Baretta, Ironside, Batman* and *The Odd Couple*. Barton also worked as a music consultant for Frank Sinatra, the Rolling Stones, Peggy Lee, Tony Bennett, and John Lennon.

MILTON BERLE, 93, (3-27-02) comedian. Berle worked in every mass medium of the 20th century, from silent films, the Broadway stage and vaudeville to talkies, radio, television and nightclubs. Television, however, made him a superstar and earned him the title "Mr. Television" when he emceed *The Texaco Star Theater* on NBC beginning June 8, 1948. During its first season the show was viewed by four out of five TV sets in the nation. Berle continued to host his own show, in some form, on NBC through 1956. Over the years he made numerous TV appearances on such shows as *Amazing Stories* (NBC), *The Big Valley* (ABC), *The Danny Thomas Show* (ABC/CBS), *Don Adams' Screen Test* (syndicated), *F Troop* (ABC), *The Hollywood Palace* (ABC), *Jackpot Bowling Starring Milton Berle* (NBC 1959-1961), *Max Liebman Presents* (NBC) and *The Music Shop* (NBC). Some of Berle's radio credits include *Community Sing* (CBS 1936-1937), *The Milton Berle Show* (CBS 1943-1946, NBC 1947-1948), *The Old Gold Hour* (CBS 1934), *The Rudy Vallee Show* (NBC), *Stop Me If You've Heard This One* (NBC 1939-1940), *The Texaco Star Theater* (NBC 1948-1949), *Three Ring Time* (Blue Network 1941-1942) and *Who Said That?* (NBC). Some of his film credits include *Tillie's Punctured Romance* starring Charlie Chaplin and Marie Dressler and *Rebecca of Sunnybrook Farm* with Mary Pickford. Berle made his Broadway debut in 1920 in *The Floradora Girl* and later appeared in *Ziegfeld Follies* and *Earl Carroll's Vanities*. He received the first Emmy Award to an individual for "Most Outstanding Kinescope Personality of 1949" and was the first inductee into the TV Hall of Fame in 1984.

OTIS BLACKWELL, 70, (5-6-02) songwriter. Blackwell is credited with writing more than 1,000 songs using his name, pseudonyms and split authorships. Some of Blackwell's compositions include *All Shook Up, Don't Be Cruel, Great Balls of Fire* and *Fever. Don't Be Cruel* was recorded by Elvis Presley on July 2,1956 and sold more than 3 million copies. The recording proved a breakthrough for Blackwell and Presley. Some of the other songs he wrote or collaborated on were sung by Jerry Lewis (*Breathless*), Dee Clark (*Hey Little Girl*) and James Taylor (*Handy Man*). Blackwell, who had a major part in shaping rock 'n' roll, recorded an album of his own hits in the late 1970s and began touring.

DR. MAI CRAMER, 54, (2-27-02) radio personality. Cramer hosted *Blues After Hours* on WGBH(FM) in Boston for the last 24 years. It was the longest running blues program in the region. Her first programs on the station were Friday night's *CD Playback* and Saturday's *Blues A-Z*. Earlier, Cramer's extensive collection of blues recordings helped her land a disc jockey job at WGRG in Pittsfield, MA. She received a W.C. Handy award for "Keeping the Blues Alive." In addition to working at Digital Equipment Corp. for 10 years, she taught communications and technical writing courses at a number of local colleges.

JOHN FRANCIS "JACK" CULLEN, 80, (5-11-02) radio personality. Cullen was the host of

the late show *Owl Prowl* on CKNW(AM) in Vancouver, British Columbia. He interviewed almost every entertainer who came to town and became friends with Bob Hope, Sammy Davis, Jr., Louis Armstrong and Henry Mancini. Cullen joined the station in 1949 and remained there until the show went off the air in 1999.

ALAN DALE, 73, (4-20-02) singer. Dale, a popular vocalist of the 1940s and 1950s, made television appearances, recorded and performed at movie theaters and such clubs as the Copacabana in New York City, the Latin Quarter in Boston and the Sahara in Las Vegas. Some of his hit recordings were *Oh, Marie; Cherry Pink (and Apple Blossom White), Sweet and Gentle* and *Heart of My Heart*. He appeared on such TV programs as *The Alan Dale Show* (DuMont 1948 and CBS 1950-1951), Dick Clark's *World of Talent* (ABC), *Opera Vs. Jazz* (ABC 1953) and *Sing It Again* (CBS). Dale also sang on the radio version of *Sing It Again* (CBS 1948-1951).

EILEEN FARRELL, 82, (3-23-02) soprano. Farrell, one of the leading dramatic sopranos of her time, performed with the Metropolitan Opera for five seasons. *Look Magazine* described her voice as "perhaps as close to a flawless soprano instrument as exists in the world today." Farrell could also cross over and sing jazz and popular music such as *I've Got a Right to Sing the Blues* (1960). She also made radio appearances on *The American Melody Hour* (CBS 1942-1948), *Broadway Matinee* (CBS 1943-1944) and *The Prudential Family Hour* (CBS 1945-1948).

WILLIAM W. HANSEN, 79, (3-20-02) radio executive. Hansen was the longtime General Manager of WJOL(AM) Joliet and founder of Midwest Broadcasting Inc. He began his career in 1958 managing KMCD(AM), a failing station in Fairfield, IA. In 1964 the station's owner asked him to manage WJOL(AM) and WLLI(FM) in Joliet. He remained there until the stations were sold in 1987. During the 1970s Hansen purchased a total of 10 radio stations in Colorado, Illinois, Wisconsin and Iowa. In 1987 he started Midwest Broadcasting Inc, a radio brokerage company. He was President of the Illinois Broadcasters Association in 1974.

HENRY J. KASPEROWICZ, 84, (3-31-02) pioneer in color TV technology. Kasperowicz invented one of the early all-color, all-electronic television tubes while employed at the Allen B. DuMont Laboratories in Passaic, NJ. A patent (later purchased by RCA) was issued to the firm in 1950. At the time of the invention, DuMont stated the new cathode-ray tube could "be applied to any existing color or black-and-white television system without obsolescence of existing receivers." The firm is no longer in business.

PAUL W. KLIPSCH, 98, (5-5-02) audio system pioneer. Klipsch created a horn-loaded speaker design and, in 1946, founded the company that bears his name. The first Klipschorn was manufactured in Hope, AK which is now the home of the Klipsch Museum of Audio History. Klipsch Audio Technologies, now located in Indianapolis, makes specialty speakers for home, commercial use and computer systems. Klipsch refined the design of his folded-corner woofer, the prototype of the Klipschorn, while he was in the Army, stationed at the Hope Proving Grounds, during WWII. Klipsch was inducted into the Audio Hall of Fame in 1984.

SPIKE MILLIGAN, 83, (2-27-02) comedian. Milligan was the originator of the lunatic brand of postwar British humor which took the form on radio of *The Goon Show*. The program was beamed around the world by the BBC and British Forces Network from 1952 to 1960. Milligan was the ringleader, and sole survivor, of a group of anarchic comedians which included Peter Sellers, Harry Secombe, and Michael Bentine. Milligan also performed in films and television and is credited with being the inspiration for *Monty Python's Flying Circus*.

DUDLEY MOORE, 66, (3-27-02) actor. Moore is probably best remembered for his film roles in *10* and *Arthur*. When George Segal walked out of Blake Edwards' production of *10* he asked Moore to take the part. The 1979 film, co-starring Bo Derek, established him as a Hollywood star. Two years later he had another hit in *Arthur,* starring Lisa Minnelli. Earlier in his career he had teamed with Peter Cook in *Not Only...But Also*, a television comedy series. The two made their screen debuts in *The Wrong Box* in 1966 and a year later appeared in *Bedazzled*. In 1971 they teamed up again in a comedy review titled *Beyond the Fridge*, which was a hit in London and a smash on Broadway during the 1973-1974 season.

DR. ROBINSON PIERCE, 92, (4-2-02) electrical engineer and acoustics expert. Dr. Pierce headed the team that invented the transistor at the Bell Telephone Laboratories in NJ. He suggested the name for it in 1949. Later, Dr. Pierce became interested in the concept of communications systems from space and was a major force behind Echo I, the world's first communications satellite. He received many patents, including one for a reflex klystron which was used in radar applications. When Dr. Pierce left Bell in 1971 he was Executive Director of Research in Communications. Following this, he simultaneously taught at the California Institute of Technology and (until 1982) worked for the Jet Propulsion Laboratory.

JOHN ROHRBECK, 62, (4-27-02) television

executive. Rohrbeck was President of the NBC Television Stations Division from 1991 to 1997. The Division included eleven owned and operated stations in major markets with annual revenues of $500 million. After holding a number of advertising sales positions with NBC and KNBC(TV) in Los Angeles, Rohrbeck was appointed Manager of the station in 1976. He was later named General Manager of NBC's WRC(TV) in Washington, DC. Rohrbeck returned to KNBC(TV) as President and General Manager in 1984 and remained there for 11 years. He gave up the presidency of the stations division to become an NBC Executive VP.

DEL SHARBUTT, 90, (4-26-02) broadcast announcer. Sharbutt was one of the most familiar voices heard on radio and television. He began his career in Chicago in 1933 and a year later joined CBS and moved to.New York City. Some of his many radio announcing credits include *Amos 'n' Andy* (CBS 1943), *The Ask-It Basket* (CBS 1938-1941), *The Campbell Playhouse* (CBS 1940-1941), *Club Fifteen* (CBS 1947-1953), *Lum and Abner* (various networks), *Ma and Pa* (CBS 1936-1937), *Meet Mr. McNutley* (CBS 1953-1954) and *Singin' Sam* (syndicated 1939-1942). Sharbutt was also heard on many of the early television shows starring Bing Crosby, Bob Hope, Robert Benchley, the Dorsey Brothers as well as *Your Hit Parade* (NBC 1957-1958). He was later a newscaster for the Mutual Radio Network. As a spokesman for Campbell's soups, Scharbutt originated the commercial line "Mmm, mmm good."

ROBERT URICH, 55, (4-17-02) actor. Urich is probably best known for his television appearances in *Vegas* (ABC 1978-1981) and *Spencer for Hire* (ABC 1985-1988). His first television role was in the comedy series *Bob & Carol & Ted & Alice* (ABC 1973). Urich also appeared in *S.W.A.T.* (ABC 1975-1976) before joining the sitcom *Soap* (ABC 1977). He won an Emmy in 1992 for his narration of the cable documentary *U-Boats: Terror on Our Shores*. Urich's film credits include *Ice Pirates* (1984) with Angelica Houston and *Turk 182!* (1985) with Timothy Hutton. He worked briefly in Chicago as a radio sales agent and as a television meteorologist.

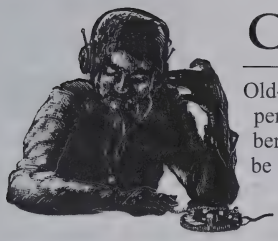
SYLVESTER L. "PAT" WEAVER, 93, (3-15-02) former NBC executive. Weaver was responsible for many programming innovations during the early years of television broadcasting. Many of them continue to flourish today such as *The Today Show* (NBC January 14,1952 to date) and *The Tonight Show* (NBC September 27, 1964 to date). Some of Weaver's other successful shows include *Your Show of Shows* (NBC 1950-1954), *The Colgate Comedy Hour* (NBC 1950-1955) and the NBC spectaculars, including *Producer's Showcase* (NBC 1954-1957) and *Max Liebman Presents* (NBC 1954-1956). He also impacted television business by moving control of programming from advertising agencies to the NBC network and underwriting program costs through multiple sponsorships. Weaver also created the weekend program *Monitor* (1955-1974), which helped revitalize NBC's radio network. Weaver joined NBC in 1949 as VP in Charge of Television and director of its new television network. He became President of NBC in 1953, was named Chairman of the Board of Directors in 1955 and resigned the following year. After leaving NBC he was involved in media projects including a part-time TV network, a pay-TV project in California and Jerry Lewis' Muscular Dystrophy Telethons. He began his broadcasting career in 1932 at Don Lee's KHJ (AM) and at CBS in Los Angeles.

Information for this column was obtained from *The Best Seat in the House: The Golden Years of Radio and Television* (Pat Weaver), *Broadcasting and Cable, The Complete Directory to Prime Network TV Shows 1946-Present* (4th ed.), *The Hartford Courant, On the Air: The Encyclopedia of Old-Time Radio, The New York Times, The North Texan, Variety,* www.broadcastingcable.com, www.legacy.com and www.nytimes.com. Thanks to Frank Q. Newton, Jr., W6SYG; Dr. E.E. Taylor and Dr. A. David Wunch for additional source material.

ADDITIONAL LODGING AT THE CONFERENCE

While the RIT Conference Center is clearly the most convenient location, other accomodations are available in the immediate area. Among them are:

Country Inn and Suites 585/486-9000	Fairfield Inn 585/334-3350	Red Roof Inn 585/359-1100
Days Inn 585/334-9300	Microtel 585/334-3400	Super 8 585/359-1630



Classified Ads

Old-time ads are free to members collecting and restoring equipment for personal use. Please observe the following: (1) one ad per issue per member; (2) include as SASE if acknowledgement is desired; (3) material must be more than 25 years old and related to electronic communications; (4) give your full name, address and zip code; (5) repeats require another notice (we are not organized to repeat automatically); (6) the AWA is not responsible for any transaction; (7) we retain the right to reduce an ad's size if over seven lines; (8) AWA does not accept commercial advertising in this column; and (9) closing date is six weeks prior to first day of month of issue. Ads received after that time will be held for the following issue. Mail all ads to: **RICHARD RANSLEY, P.O. BOX 41, SODUS, NY 14551**.

IMPORTANT!

OTB classified ads are now available for browsing in the "*OTB On Line Edition*" on our internet web site (www.antiquewireless.org). This practice will give members dramatically increased exposure for their ads.

SELL/TRADE—GENERAL

Victor phonograph, 1900 Trademark Model, sold by Berliner Gram-O-Phone of Canada. All Restored and working. Peter Denman, 7896 Wellington Road 109, Arthur, Ontario, Canada N0G 1A0

Galena crystal radios. Homemade hardwood case, polished, lacquered panel and cover liner, advanced circuit. Improved sensitivity and selectivity. Radio tubes, state your needs. 50 cents and up. Also radio parts. Leonard Gardner, 458 Two Mile Creek Rd., Tonawanda, NY 14150 E-mail: radiolen@aol.com

John Baird stock certificate 1931, inventor of TV, only $100 each. J. J. Papovich, 165 Trellis Lane, Sewell, NJ 08080 (856) 464-6741

Motorola 1950s car radio in good working condition, $75. OBO; nice floor model radio, $65.; magnificent Tektronix oscilloscope, 20 MHz, $100. OBO. Paul Recupero, 265 Union St., Portsmouth, RI 02871-2209

RCA Strato-World in good condition, works, $100.; Drake R8 receiver, like new, $425.: RCA PX600 1950s portable, plum color, $100. Terry Adelwerth, 145 Brookfield Ave., Center Moriches, NY 11934 (631) 878-6978 E-mail: terrya@ieaccess.net

Fada 160A, $125. OBO; one tube home brew or good kit, $35.; crystal set, made from battery set, $25. Carl Goatcher, W0HCL, 35 James River Road, Kimberling City, MO 65686 (417) 739-2515

Magnavox console radio AM/SW with 78 RPM record changer, Model 151B, $50., GE table clock radio, model 514, $30., Emerson Electric 78 rpm phonograph, $20. All in working condition. Pick-up only. William Albohn, 69 Quaker Hill Rd., Pawling, NY (845) 855-1936

Military TCS-12 transmitter, receiver and antenna loading coil, $160.; RBM-4 set with 2 receivers covering 200 kHz to 20 MHz and a 120V power supply, $160.; Coast Guard 11 tube receiver which covers 200 kHz to 19MHz in 6 bands, $130.; Sunscope motor tester with 5 tube-type instruments and sign, $100.; or BO; SX-25 with bass reflex speaker system, $375.; S-76, $175.; S-19R, $100.; S-41, $50.; Knight R-55, $50. Malcolm Burdick, W1NOO, 156 Station Rd., Hampton, CT 06247 (860) 455-9640 before 8 PM please

SELL/TRADE—LITERATURE

Radio News magazine, 1943 thru 1960, 50 cents per copy. Robert Martin, 111 Bancroft, Rochester, NY 14616 (716) 663-4182

SELL/TRADE TEST GEAR

Millen Grid Dip Meter 90651 # 1521 plus 4 inductors: 46705-220 Kc-350 Kc, 46704-325 Kc-

600 Kc, 46703-500 Kc-1050 Kc, 46702- 425 Kc-2000 Kc. $50. plus $25 shipping. Barney Moffatt, W5CJZ, 5714 Trail Meadow Dr., Dallas, TX 75203 (214) 363 3406

Heathkit Test Equipment—all with original manuals: AC VTVM, Model IM-21, $35.; Sine-Square Wave Audio Generator, Model AG-10, $15.; Condenser Checker, Model C-3 (has defective power factor/power switch control), $15.; UPS shipping extra. Also Oscilloscope, Model O-10 & Electronic Switch, Model S-3 (for dual trace operation capability). Scope has 5" pix tube in good condx. The 2 unit combo, $90. Pickup only on the scope & elec. sw. Robert Eckert, 133 East 7th St., Clifton, NJ 07011-1104 (973) 340-0579

Q-meter, Boonton Type 190A, in excellent condition, with manual, $150. plus S&H. Leonard Gardner, 458 Two Mile Creek Rd., Tonawanda, NY 14150 E-mail: radiolen@aol

SELL/TRADE—TUBES & TRANSISTORS

Fourteen blue tubes, all are good. 6 - 27, 1 - 71, 3 - 24, 2 - 26, and 2 - 56. $250. plus UPS. A. Bruno, 24 Butternut Dr., New City, NY 10956 (845) 354-8899

A replacement for the UV99, our 999R replaces your UV99. Our V999 operates with a filament voltage of 1.5 VDC. Both use a 5676 proximity fuse subminiature tube. $15. plus first class shipping. James Fred, 53558 275W., Cutler, IN 46920 (765) 268-2214

Over 75 types of transmitting tubes available. Duplicates of some types. Sockets for most types. Send SASE for complete list. Available as a collection or individually. Harry Mills, K4HU, 631 4th Avenue West, Hendersonville, NC 28739 (828) 693-7519 E-mail: k4hu@arrl.net

---

2-2N66 crystal unit, amplifying, Western Electric, NIB might be used in Collins radios, $15. each plus UPS. John Uscinowski, 95 Vly Summit Road, Greenwich, NY 12834-9519

Transmitting and broadcast radio tubes for sale. Some NIB and others used. SASE for list. Herman Fothe, 5292 Tiffany Ann, West Palm Beach, FL 33417

NOS Tubes for sale. Price shown is for each tube: 872-A, $40.; 2-CK6476, $25.; 2-7587, $22.; 12AU7, 5876, $13.; 5675, 12AT7, 3-5U4GB, 5581, $10.; 6-6CW4, 3-927, $8.; 3-6SN7GTB, 2-6A7, $6.; 4-5751, 4-CCM Lamps, $5.; 930, 10-6080, 884, 6SL7, $4.; 4-5963, 9002, 3A7GT, 6F7, 2C51, $3.; 6AN5WA. 1E7, 2-3D21, $2.; 4-12A6, 1A6, 1C6, $1. Unused, tested, Cunningham CX-350, $150.; 918, $6.; 2-6336, $16.; 10-5U4, 2050A, $5. All prices plus shipping. John T. Kaetz, Jr., 6841 Chessea Rd.,, Bessemer, AL 350023 (205) 491-2933

Myers universal tube, original box with hardware and instruction sheet. New old stock. Rare part of Myers history, $160. USD. Steve Dow, 2746 Zilinsky Road, Powell River, BC, Canada (604) 487-4295 E-mail dows@ualberta.net

WANTED—COMMUNICATIONS GEAR

Want Hallicrafters 5-T with "Boy" on dial in headphones using key, ca 1935. Will pay premium price for collector quality example. William Ross, W9WR, 300 Oxford Rd., Kenilworth, IL 60043 (847) 251-7447 E-mail: william.ross@attbi.com Will be at fall Conference

---

Looking for HRO60 Coil Set "H" (100 - 200 kHz). Marc Ellis, 1914 Colfax St., Evanston, IL 60201; 847-869-5016; mfellis@enteract.com

WANTED—GENERAL

Marantz's first Power Amplifier, working or not. Charles Graham, 4 Fieldwood Drive, Bedford Hills, NY 10507 (914) 666-4523

Want to buy a 8BP4 CRT and a 7JP4 CRT. Thanks for your help! Charles Harper, 2000 Jackstown, Road, Paris, KY 40361 (859) 484-9393 E-mail: charper@kyk.net

---

Zenith Black Dial radios, Philco 70 or 90 and vintage Hi-Fi. Please call me toll free (800) 594-4359. Mike Urban, P.O. Box 2294, Westport, CT 06880. E-mail: mike@urban-antiqueradio.com

---

Excellent original "Penthouse" Pla Pal and Wilcox Gay A-17 radios. Restorable chassis for a Stromberg Carlson 240 H radio. A blue jeweled light for SW band on a Mae West 197 Emerson radio. Also Detrola 5-D Oscillator coil Part #1126. Joseph DiCaro, 4155 Lastrada Heights, Mississauga, Ontarion, Canada, L5C-3V1, new E-mail: decoradio@primus.ca

WANTED—INFORMATION

I need someone to repair the electric clock movement of the clock in Westinghouse WR 8R

(continued on page 76)

BUSINESS CARD ADS

Are you offering a product or service of interest to antique radio enthusiasts? Would you like to let the world know about the tubes, sets or paper you'd like to acquire? Place a business card in this space for the low price of $15.00 and it will seen by over 4,000 hard core devotees of our hobby. Purchase a year's worth of insertions (four issues) for $50.00 and save $10.00 over the individual ad pricing.

Send us a copy of your business card, or a special typeset ad designed to fit our standard space. We can, alternatively, typeset a short message for you (no more than eight lines, 50 characters max per line, please). For the time being, there will be no charge for typesetting. All ads must be for radio-related items or services and must be paid in advance. Send your ads and checks (payable to AWA) to Robert W. Perry, "Smoke Signals," 131 E. High St., Painted Post, NY 14870. Closing date is six weeks prior to first day of month of issue. **All advertising income is used to further the conservation work of the AWA Electronic Communication Museum.**

CLASSIFIEDS, *continued from page 74*

Columnaire Grandfather Clock radio, Circa 1931. Charles Harper, 2000 Jackstown Road, Paris, KY 40361 (859) 484 9393 E-mail: charper@kyk.net

Need circuit diagram of an old Triplett voltohmeter circa 1936-37, serial number 4767. Alton DuBois, Jr., 67 Peggy Ann Road, Queensbury, NY 12804 (518) 792-3130

Audio information. Consumer's Union article (1930s) Triode amplifier. Magazine not needed, just the story. High price will be paid. Charles Graham, 4 Fieldwood Drive, Bedford Hills, NY 10507 (914) 666-4523

WANTED—LITERATURE

Need original copies following *OTB*s to complete my collection: Vol. 1, No. 4; Vol. 2, No. 1; Vol. 3, No. 2; Vol. 5, No. 2; Vol. 6, No. 2. Also need Vol. 5, No. 3 of ARCA Gazette. Will purchase or have many early *OTB*s to trade. William Ross, W9WR, 300 Oxford Rd., Kenilworth, IL 60043 (847) 251-7447 E-mail: william.ross@attbi.com Will be at fall Conference

Want to buy Volume 12 of *AWA Review*. Mike O'Brien, 1031 University St., Springfield, MO 65807 (417) 887-0373 E-mail: k0myw@att.net

Need a copy of *QST*, March 1920, page 44, and would like to have more information on Grebe "Synchrophase", mentioned in *OTB*, Feb. 2002, p. 41, under the heading vintage 1923-27. Alfred Stoll, Reichenberger Str. 76, D-65510 Idstein, Germany

WANTED—PARTS

Brass nameplate for SCR 59 Western Electric airplane receiver or will buy parts set. Ed Bell, 5311 Woodsdale Rd., Raleigh, NC 27606 (919) 851-1517 E-mail: ekbell@nc.rr.com

Radio chassis and clock for Lyric Wurlitzer Model S-6 grandfather clock radio. Anything that will fit and nonworking OK. James Fisher, RR1, Box 861, Port Royal, PA 17082 (717) 527-2224 E-mail: yrless@tricountyi.net

Want external S-meter unit Model SM-40 used in the S-40B Hallicrafters communications receiver. Also want any model of the Vibroflex telegraph key. Carlos Alberto Fazano, P.O. Box 25, Osasco, SP, Brazil O6016-970 E-mail: fazano@panambraindustrial.com.br or fax 55 11 3272 8777

Two or more National Radio "P Dial"s with Scale 5. These are knob/dial combinations about 3 1/2 inches in diameter with scales covering 360 degrees, marked 0-200. Not Velvet Vernier! Similar dials may have been made by Millen, Kurtz Kasch, and Crowe America. Richard Schappee, W5HQJ, 2955 Corte Milguel, Concord, CA 94518 (925) 682-1644 E-mail: Jdco@constant.com

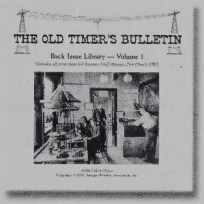
NOW AVAILABLE FROM THE AWA MUSEUM STORE

All profits are used to support the Museum • See back cover for order blank

AWA REVIEW VOLUME 14

Five articles with over 200 photographs documenting the history of early wireless and radio. Also contains the first cumulative table of contents covering all previous volumes of the *Review*. The articles cover (1) the role of spark keys in the history of wireless telegraphy (by Russ Kleinman, James Kreuzer, Karen Blisard, and Felicia Kreuzer), (2) a project being conducted by Russ Kleinman and Karen Blisard in which they are attempting to chronicle and list all known manufacturers of spark keys, (3) the history of the Canadian Marconi Company (by Robert Murray and Roger Hart), (4) the work of De Forest and Johnson at the American Wireless Telegraph Company (by Glenn Trischan), and (5) the artistic and technical origins of some of the Bakelite radio cabinet designs (by Barbara Havrnek). *Price: $27.50 US postpaid in U.S. and Canada; elsewhere, add $5.00*

THE OTB ON CD ROM



These discs run on any PC or Mac system capable of running Acrobat 4.0 (free copy included). PCs should have 486 or better processor, 10 Mb of free hard disc space, MS Windows 95 or 98 or NT 4.0 with service pack 3 or later.

Volume 1 (Contains all issues from January, 1960 - March, 1985) *Price: $49.95 US, postpaid in U.S. and Canada; elsewhere, add $5.00*

Volume 2 (Contains all issues from June, 1985 - November, 1996) *Price: $49,95 US, postpaid in U.S. and Canada; elsewhere, add $5.00*

Volumes 1 and 2 ordered together *Price: $89.95 US, postpaid in U.S. and Canada; elsewhere, add $5.00*

NEW!!! AWA REVIEW 1-5 ON CD ROM

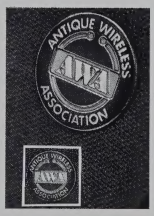
Operating requirements same as *OTB* CDs above. Now you can acquire these scarce, out-of-print volumes for your library. *Price: $19.95 US, postpaid in U.S. and Canada; elsewhere, add $3.00.*

INDEX OF AWA PUBLICATIONS

Master index of *The OTB*, *The AWA Review*, and other AWA documents through March, 2000. Available on either paper or 3.5-inch floppy disk (specify when ordering). Text format, searchable with your word processor.

Price: $9.00 US, postpaid in US and Canada for either version (please specify). Elsewhere, add $1.00.; $2.00 discount with any purchase of $19.00 or more (see back cover). NOTE: This index is included on the *AWA Review* CD ROM and both of the *OTB CD* ROMs.

HANDSOME AWA PIN



Replaces the far-too-expensive hand-made gold pins of yesteryear. The new pin maintains the stylized AWA logo surrounded by a Hertz loop, but adds the words "Antique Wireless Association" wrapped around the loop in bright gold. Background is dark blue cloisonné and the pin is clutch mounted. 1" in diameter. *Price: $6.00 US and Canada, elsewhere, add $1.00.*

AWA COFFEE MUG

Heavy porcelain mug in cobalt blue with yellow-gold AWA lettering and logo. good for daily use and dishwasher safe. *$9.75 postpaid in US and Canada.*

Make checks out to "AWA Museum" and send to Ed Gable, Curator, AWA Museum, 187 Lighthouse Rd., Hilton, NY 14468.

MUSEUM STORE ORDER FORM

OTB BACK ISSUES *Priced at $3.00 each postpaid. 20% discount for orders of 6 or more issues; 30% discount for orders of 12 or more. AWA review issues do not count towards the discount.*

QTY	ISSUE	QTY	ISSUE	QTY	ISSUE	QTY	ISSUE
_____	25-4	_____	29-2	_____	32-2	_____	36-1
_____	26-1	_____	29-3	_____	32-4	_____	36-2
_____	26-2	_____	29-4	_____	33-2	_____	36-3
_____	26-3	_____	30-1	_____	33-4	_____	36-4
_____	26-4	_____	30-3	_____	34-1	_____	37-1
_____	27-1	_____	30-4	_____	34-3	_____	37-2
_____	28-1	_____	31-1	_____	34-4	_____	37-3
_____	28-2	_____	31-2	_____	35-1	_____	37-4
_____	28-3	_____	31-3	_____	35-2	_____	38-2
_____	28-4	_____	31-4	_____	35-3	_____	38-3
_____	29-1	_____	32-1	_____	35-4	_____	38-4

Volumes 39-42 — All Issues Available

INDEX OF AWA PUBLICATIONS *$2.00 discount with purchases of other items totaling $19.00 or more.*

QTY	VERSION	QTY	VERSION
_____	3.5-inch floppy @ $9.00	_____	hard copy (paper) @ $9.00

AWA REVIEW BACK ISSUES *Priced as indicated. No quantity discount.*

QTY	ISSUE	QTY	ISSUE	QTY	ISSUE
_____	Volume 6 $6.00	_____	Volume 8 $6.00	_____	Volume 10 $13.00
_____	Volume 7 $6.00	_____	Volume 9 $13.00	_____	Volume 13 $16.95
				_____	Volume 14 $27.50

CD ROM DISKS *Priced as Indicated.*

OTB BACK ISSUE CDS

QTY	DISC	QTY	DISC	QTY	DISCS
_____	Vol. 1 (issues 1-1 thru 25-4) @ $49.95	_____	Vol. 2 (issues 26-1 thru 37-4) @ $49.95	_____	Set: Vol. 1 and Vol. 2 @ $89.95

AWA REVIEW BACK ISSUE CD

QTY	DISC
_____	AWA Review Vols. 1 thru 5 @ $19.95

AWA MEMBERSHIP PIN

QTY	
_____	Pin @ $6.00

AWA COFFEE MUG

QTY	
_____	@ $9.75

ORDER TOTAL CALCULATION *Note: Foreign postage surcharge does not apply to Canada.*

_____ **OTB Back Issues @ $3.00 = $_____**
Subtract $_____ Discount (if any) / Add $3.00 foreign postage if applicable. ***Total OTB Order $_____***

_____ **Indexes (paper or disk) @ $7.00 = $_____**
Subtract $2.00 discount if applicable / Add $1.00 foreign postage if applicable. ***Total Index Order $_____***

_____ **Total AWA Review Cost = $_____**
Add $5.00 per volume foreign postage if applicable. ***Total Review Order $_____***

_____ **Individual OTB Back Issue CDs @ $49.95 = $_____**
Add ____**Vol 1 + Vol 2 sets @ $89.95 = $_____**
Add $5.00 foreign postage if applicable. ***Total OTB CD Order $_____***

_____ **AWA Review Volume 1-5 CDs @ $19.95 = $_____**
Add $5.00 foreign postage if applicable. ***Total AWA Review CD Order $_____***

_____ **AWA Membership Pin @ $6.00 = $_____**
Add $1.00 foreign postage if applicable ***Total Membership Pin Order $_____***

_____ **AWA Coffee Mug @ $9.75 = $_____**
Add $1.00 foreign postage if applicable ***Total Coffee Mug Order $_____***

Grand total of individual total amounts = $_____

Please make your check payable to AWA Museum and send to:
Edward M. Gable, 187 Lighthouse Rd., Hilton, NY 14468.

Name _____ Address _____

_____